Vocalic Representation in Tokyo and Owari Japanese

Towards a syllable-free account

Connor Youngberg

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Department of Linguistics

SOAS, University of London

Declaration for SOAS PhD thesis

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Abstract

This thesis proposes a syllable-free analysis of Japanese phonology couched within Government Phonology (Kaye, Lowenstamm & Vergnaud 1990). I argue in favour of Strict CV representations (Lowenstamm 1996, Scheer 2004) and I redefine the notion of a syllable, a mora and the structure of long vowels and diphthongs. The thesis first discusses the basic synchronic and diachronic facts of Japanese, before focusing on accentual and segmental phenomena in the Tokyo and Owari dialects. The use of the syllable and branching constituents is rejected, and novel proposals are made to capture the behaviour of 'special moras' and processes such as coalescence when the syllable is not available. This work builds on previous Government Phonology proposals from Yoshida S. (1996) and Yoshida Y. (1999). Comparison is also made to the mora-based framework of Labrune (2012a,b) and the auto-segmental proposals put forth by Haraguchi (1977). Crucial outcomes include the re-definition of the moraic nasal N as a nasal vowel, a new proposal for diphthong formation through government between segments, and an account for the variation found in accentuation of 'special moras' through projection parameters regulation governed or licensed V positions.

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I dedicate this thesis to my mom and my dad.

0. Introduction

In this thesis, I discuss the phonology of the Tokyo and Owari dialects of Japanese, and I propose that a syllable-free approach can capture the accentual and segmental processes found in each dialect. A recent proposal from Labrune (2012a,b) has argued that the syllable node is not necessary for the analysis of Japanese phonology. Her proposal has been criticised in the literature as it is claimed that without the syllable constituent, one cannot adequately account for processes like nasalisation and accent shift which are reliant on the syllable constituent (Vance 2013, Tanaka 2013, Kawahara 2016). I argue that processes of accent shift and other processes motivating the syllable are easily reanalysed once we modify the representation of 'syllables' and moras. I also argue that certain processes are spurious or must be re-characterised once we have discarded the syllable.

The syllable-free proposal from Labrune (2012a,b) is not the only one within Generative phonology, which has argued that the syllable is not needed. Government Phonology (Kaye, Lowenstamm & Vergnaud 1990) and the later developed Strict CV framework (Lowenstamm 1996, Scheer 2004) argue that the syllable constituent is universally absent. From a Government Phonology point of view, Yoshida S. (1996) and Yoshida Y. (1999) have argued that Japanese does not need to be analysed using the syllable. Yoshida Y. (1999) has further proposed that the syllable branching constituents are un-necessary in an analysis of Standard Japanese pitch accent assignment. These works have largely been ignored in the literature. I bring a GP analysis to the fore and propose that truly non-branching Strict CV structures can redefine the structure and role of moras, special moras and syllables. I also expand the scope of analysis to account for more than one dialect. I focus on the Tokyo or Standard dialect spoken in the capital region of Japan as well as the Owari dialect, spoken in Nagoya city and the northern municipalities of the Nōbi plain. Let us first consider the working definition of the syllable and the mora before I preview the coming chapters.

0.1 Defining the Syllable and the Mora

The syllable and mora may defined firstly in pre-generative terms, with both concepts used as a tool of analysis and language description most famously found in the work of Trubetzkoy (1969) and other structuralists. Languages in his work are typically divided into syllable languages, such as English, and mora languages, such as Japanese or Ancient Greek, where phonological processes such as accent assignment are sensitive to the mora or the syllable, and in a language like Ancient Greek each mora may have a different tone or accent. This same generalisation holds in Structuralist analysis, as well as later Generative analysis.

In formal Generative work, which I focus on in this thesis, the mora is considered a position of timing and weight nested within a syllable constituent. McCawley (1968) is one of the earliest works to weave generative processing and serial rules in phonology, utilising both the syllable and the mora in rules capturing phonological processes such as accent assignment. Before McCawley (1968), it was widely agreed that Japanese was a mora-based language and did not refer to the syllable, following Trubetzkoy and the traditional literature. McCawley proposed that the syllable was relevant for loanword accent assignment and altered the landscape.

The syllable and mora in formulations of Japanese phonology are commonplace after the seminal work of McCawley (1968). The syllable as a generative constituent dates to Venneman (1972), Hooper (1976) and Kahn (1976), and the mora as a constituent for timing and weight originates in Hyman (1985) and Hayes (1989, 1995). From this point of view, processes may be weight sensitive, where a light syllable contains one mora, and a heavy syllable contains two and this weight may attract stress or accent, as in Latin. Moras were also used to account for compensatory lengthening (e.g. Poser 1984, Hayes 1989).

Since McCawley's work, it is generally agreed that Japanese syllables have one or two moras, with the second mora being restricted to the vowel /i/, the second half of a long vowel or geminate or the moraic nasal. The second mora is unable to take an accent, but all moras are counted in processes such as metre formation. Both syllable and mora are used ubiquitously to account not only for accent assignment in Japanese, but also assimilation processes such as nasalisation, restrictions on syllable length to bimoraic syllables, word formation processes and speech errors (cf. Kubozono 2001, Vance 2008, Labrune 2012a, Kawahara 2015, see Chapter 4).

The use of the syllable constituent in the analysis of Japanese is not universally agreed upon, however. Recently, Labrune (2012a) has challenged the use of a syllable constituent and seeks a return to a syllable-free representation of Japanese as it is problematic in certain respects. I also argue that the syllable is unnecessary based on processes which either do not respect the syllable or which can be reanalysed without the syllable. I aim to explore the representation of Japanese within a framework which bans not only syllables but also moras as constituents, namely Strict CV (Lowenstamm 1996).

I claim in this thesis that a 'mora' is a CV unit and that the 'syllable' is unnecessary as a constituent, with syllable affects being related not to a constituent but to the status of a V position. Furthermore, no branching constituents are necessary to account for the facts of pitch accent assignment and other phonological processes. Building on an earlier Government Phonology proposal from Yoshida Y. (1999), I define the head mora of a syllable or suitable site of an accent as one where the V position can project, while the dependent mora of a syllable is a CV unit where the V position is prevented from projecting. I reanalyse the representation of dependent or special moras and show that they are indeed deficient (as proposed by Labrune 2012a), though I define deficiency through the existence and silencing of empty C or V positions through the well-recognised forces of government or licensing. Crucially, I address processes which supposedly require invocation of the syllable, such as accent assignment, and address problematic aspects of the previous syllable-free proposals. I outline my chapters below.

0.2 A preview of each chapter

Chapter 1 provides a brief introduction to the phonology of Japanese. I discuss the accent systems of Tokyo and Owari Japanese, as well as processes that affect consonants and vowels in each dialect. I focus on processes and facts that are discussed throughout the thesis. I also present a brief discussion of coalescence typology. I show that the Owari dialect is worthy of further research as it exhibits the marked process of rounding coalescence. I slightly extend a typology of coalescence presented by Casali (2011). The systems and results of coalescence in Japanese dialects are then discussed, based on survey work from Uwano et al (1989) and Kindaichi & Shibata (1966-1972).

Chapter 2 discusses the diachronic developments in Japanese that gave rise to vowel sequences and heavy syllables, drawing largely on Frellesvig (2010), with sound changes and loanword importation bringing seismic alteration to the phonotactics of Old Japanese and Middle Japanese. I focus on the creation of vowel sequences, as this is relevant to the later discussion of hiatus, diphthongs and long vowels. I then discuss the origins of coalescence in the Owari dialect, based on investigations of Edo period Japanese from Keshikawa (1971) and Hikosaka (1997).

Chapter 3 discusses the representation of Japanese segments within Element Theory (Kaye, Lowenstamm & Vergnaud 1985, Backley 2011) and I provide an introduction to the theory, focusing on vowels. A representation for the vowel inventories is given for Tokyo and Owari Japanese. I also present representations for consonants, and I capture processes such as Owari coalescence and assimilation.

Chapter 4 critically reviews literature motivating the syllable and mora approach to Japanese, as well as evidence in favour of the syllable and the mora (McCawley 1968, Kawahara 2015). I point out problematic data for use of the syllable. I also discuss a syllable-free proposal for Japanese from Labrune (2012a,b) before considering the Government Phonology point of view.

Chapter 5 and 6 present the Government Phonology account of Japanese, building on work from Yoshida S. (1996) and Yoshida Y. (1999). Chapter 5 focuses on the representation of light syllables, captured as strictly non-branching onset-rhyme pairs. I also discuss the analysis of accent patterns, with default antepenultimate accent derived from licensing structures within a word. No reference to the mora is made within this analysis, and the syllable is discarded.

Chapter 6 focuses on non-branching structures for long vowels, diphthongs, geminates and nasal-obstruent clusters. I argue against Yoshida Y's analysis of long vowels and diphthongs, as it depends on surface branching nuclei. I revise this account and present a revised CV structure for Japanese following proposals from Lowenstamm (1996). I claim that a diphthong is a set of two segments in two positions with a governing relation present. Long vowels and geminates consist of one segment associated to two positions, namely a V and C position respectively. I also propose that a vowel plus moraic nasal N sequence is phonologically a long nasal vowel. N is never a nasal consonant found in a 'coda' position. Accent assignment through licensing is extended from the preceding chapter. I also account for marginal accentuation of the special moras R, N and J through their association to V positions.

In Chapter 7, I propose a fully revised representation of vocalic sequences. This includes an in-depth examination of long vowels, diphthongs and hiatus sequences. I account for the behaviour of vocalic sequences in both Tokyo and Owari Japanese by focusing on the prosodic structure and segmental structure of vocalic positions and the relations holding between them. I propose that long vowels are licensed and diphthongs contain a governing relation. This governing relation fails and creates hiatus in certain conditions. I also present a full analysis of coalescence in Owari Japanese, extending on the analysis in Chapter 3.

Chapter 8 then discusses various patterns of high pitch spreading or high tone spreading that originates from the site of a pitch accent. I focus on the pitch spreading facts of the Tokyo dialect (Haraguchi 1977, Yoshida Y. 1999) and Owari Japanese

(Mizutani 1960, Ebata 2013). I show that the proposed CV analysis can capture the facts in both the Tokyo dialect and the Owari dialect, while I also discuss the deficiencies of the syllable-and-mora and serial rule approach. I show that a non-branching approach and the notion of a head are integral to capturing the pitch spreading processes and their limits.

Let us now begin the thesis by establishing the foundational facts of Japanese phonology.

Chapter 1: A brief introduction to Japanese phonology

In this chapter, I set the scene for the forthcoming discussion of Japanese prosodic representations, pitch accent patterns, and vowel coalescence. I present the basic facts neutrally before moving on to the theoretical discussion in chapter 3 and onwards. In 1.1, I discuss the phonotactics and select phonological processes of Japanese. Section 1.2 summarises pitch accent assignment in Tokyo and Owari Japanese. Section 1.3 examines coalescence or vowel fusion occurring in Owari Japanese. I also present a small typology of coalescence cross-linguistically and within the main islands of Japan to show that the Owari dialect is marked and worthy of study.

1.1 Inventories, processes and structure

Below, I discuss the consonant and vowel inventories of Tokyo Japanese in 1.1.1, followed by a discussion of phonotactics, the syllable and the mora in 1.1.2. A brief overview of phonological processes affecting the appearance of certain segments is presented in section 1.1.3. For treatments of general Japanese phonology and phenomena not discussed here, see Vance (1987, 2008), Labrune (2012a) and Kubozono (2015a).

1.1.1 The consonant and vowel inventories of Tokyo Japanese

In this chapter, I describe Tokyo Standard Japanese, which is roughly equivalent to the variety of Japanese spoken in Tokyo and the surrounding area. It is also broadly equivalent to the prestige variant heard on national media. It is reflected most commonly in works discussing Tokyo Japanese as compared to other dialects (e.g. Uwano 1977) and is also reflected in normative materials such as accent dictionaries (NHK 1985).

The Tokyo dialect of Japanese has 5 vowels in its inventory, /a, i, u, e, o/, in both long and short forms. The only vowel which is slightly controversial is the high back vowel [u] and its representation. This vowel is described in the literature most commonly as a high back vowel which lacks lip rounding, but this vowel does have lip compression (Okada 1991) and is transcribed by some as [ɯ], though Vance (1987) transcribes this vowel as [u] due to the existence of lip activity. Okada (1991) claims that this vowel is best transcribed as [ɯ̟̈]. This vowel could also be transcribed as [ɯᵝ] in narrow transcription, shown in (1) below. Throughout the remainder of this thesis, I choose to transcribe the high back vowel as [u]. I note that this vowel does encode a labial quality phonologically, which is evident when it is involved in assimilation and

Owari coalescence. I discuss the assimilatory effect of /u/ below in 1.1.4. Kyoto Japanese and other Western dialects have a high back vowel with lip rounding rather than lip compression, transcribed as [u], similar to that of English. This distinction is still visible in younger speakers from Kyoto (field notes, April 2013).

(1) Vowels in Tokyo and Kyoto Japanese

a. Tokyo vowels			b. Kyoto vowels		
i i:		ɯ$^{\beta}$ ɯ$^{\beta}$:	i i:		u u:
e e:		o o:	e e:		o o:
	a a:			a a:	

In relation to vowel sequences, both hiatus sequences such as [ae] or [ue] and diphthongs such as [ai] exist in Tokyo Japanese. Hiatus sequences may receive accent on either vowel and terminate in either [a], [e] or [o], while diphthongs only exhibit accent on the first vowel in the sequence. Tokyo Japanese has the diphthongs /ai/, /ui/ and /oi/ (Kubozono 2015b). This is shown in words where accent on the antepenultimate vowel is expected, but pre-antepenultimate accent is found due to the existence of a diphthong, as in the words [to:k**ái**do:] 'Eastern Sea road' *[tokaído:]. For Tokyo (Vance 1987, Kubozono 2001, 2008, 2015) and Kagoshima Japanese (Kibe 2000, Kubozono 2004, 2015b), the vowel sequences /ai/ /oi/ and /ui/ are shown to be diphthongs as they cannot support accent on the /i/ portion of the vowel sequence. I know of no systematic examination of vowels in hiatus, though Kubozono (2015b) provides some preliminary discussion. I discuss the behaviour of diphthongs and vowels in hiatus at length in chapters 6 and 7.

(2) Consonantal inventory for Standard Japanese

	Bilabial		Alveolar		Post-alveolar	Palatal	Velar		Uvular	Glottal
Nasal		m m^{j}		n n^{j}					N	
Stop	p p^{j}	b b^{j}	t tɕ	d dʑ			k k^{j}	g g^{j}		
Fricative			s ɕ	z dʑ						h ç^{j}
Approximant						j		w		
Flap					ɾ ɾ^{j}					

The consonant inventories of Tokyo Japanese and Owari Japanese are identical. Among the relevant distinctions, there is a contrast between voiceless and voiced consonants. Additionally, there is a series of consonants produced with secondary palatal articulation (except alveolars, on which more shortly). These consonants are restricted in their occurrence in Standard Japanese, and they may only precede non-front vowels, i.e. C^j{a, u, o}. Vance (1987), Okada (1991) and Shibatani (1990) claim that /i/ palatalises all preceding consonants, but this is not contrastive. No consonants with secondary palatalisation exist before /e/. The palatal counterparts of alveolar stops and fricatives are all realised as alveo-palatal affricates or fricatives, discussed shortly. Alveo-palatals, historically the alveolar counterparts of /p^j/ etc., pattern differently and may be found preceding /e/ in loanwords such as [ɕeɸu] ‘chef’.[1]

Regarding glides, Japanese has the labial glide [w] and palatal glide [j], but /j/ is never followed by /i/ or /e/, and /w/ only precedes /a/. As for the segment which I represent above as the tap [ɾ] in the chart above, it is described by Okada (1991) as a post-alveolar tap, which he represents as [ɖ]. The Japanese tap is variously described as an alveolar tap [ɾ] in a word such as [kaɾe:] ‘curry’, while it has a semi-lateral realisation like [l] at other times as in [benli] ‘convenient’. See Vance (1987:27) and Akamatsu (1997) for extended discussion of the phonetic realisation of the Japanese tap. I represent this consonant through the remainder of this thesis as /r/ for convenience.

A comment must be made regarding the nasal consonant [N], listed above as a uvular nasal consonant. This consonant is typically called the mora or moraic nasal as it counts for one mora, though it is also called the syllabic nasal by some (e.g. Yoshida S. 2003). It is commonly transcribed as <N>, as a Romanised counterpart to the Japanese *kana* syllabary grapheme <ん>. [N] is called the uvular nasal (Okada 1991) or dorso-uvular nasal Vance (2008), as it is realised word-finally in careful pronunciation as a dorso-uvular nasal obstruent or sometimes a uvular nasal glide; Vance (1987) points out that it is difficult to ascertain whether or not there is any closure in this position. Within a word, <N> is variously realised as a consonant which is homorganic to a following stop, or intervocalically as a nasal vowel or as a nasal glide. I revisit this segment as a target of assimilation in 1.1.3. Unless I am explicitly discussing the realisation or assimilation of this segment, I will transcribe this sound as <N> following the typical conventions used in the literature.

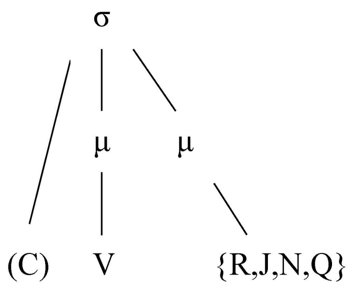
[1] I comment on the bilabial fricative [ɸ] shortly, which is an allophone of [h] preceding [u].

1.1.2 Phonotactics, the syllable, and the mora

The minimal syllable in Japanese is CV or V, as in [ki] 'tree' and [e] 'picture' and contains one mora. The maximal syllable is CVV with a long vowel or diphthong as in [to:] 'tower' or [tai] 'red snapper' or CVC, where C is restricted to either the syllabic nasal, as in [hoN] 'book', or the first half of a geminate, as in [maɕ:iro] 'completely white'. Geminate consonants consist of voiceless obstruents or fricatives in non-loanword vocabulary e.g. [pit:ari] 'perfect fit', though loanwords have introduced voiced geminates to Japanese as in [web:u] 'web, worldwide web', as well as marginal geminates such as [mah:a] 'mach' (German).[2] CVV or CVC syllables contain two moras.

It is typically assumed in the literature that Japanese is a mora-counting language, with each mora being incorporated to a syllable (McCawley 1968, Vance 1987, Kubozono 1999, Kawahara 2015). I present a template in (3) for the maximal and bimoraic Japanese syllable.

(3) The template for a bimoraic syllable



Monomoraic syllables consist only of a vowel or a consonant and a vowel, with the vowel associated to the one mora within a syllable. The syllable-initial consonant associates directly to the syllable node, using the above template. Most analyses, such as Vance (1987), do not use constituents such as the onset or rhyme. In a bimoraic syllable, the second mora is restricted to one of four segments: the second half of a long vowel (represented in the literature as R or H), the high vowel in a diphthong (J or i), the syllabic nasal (N) or the first half of a geminate (Q). These moras are typically called special moras or deficient moras (Labrune 2012a,b), as they cannot be assigned a pitch accent. Special moras are counted for accent assignment, but accent is only

[2] Research by Kawahara (2006) has shown that voiced geminates show a tendency to become voiceless in some speakers e.g. [bag:u]~[bak:u] 'bag'.

assigned to the first mora within a syllable, also known as the head of the syllable (Kawahara 2015).[3]

1.1.3 Assimilation and phonological processes

Japanese has a number of assimilation processes which affect alveolar stops and fricatives, the glottal fricative [h] and the syllabic nasal [N]. First, let us consider the palatalisation of alveolar consonants. In non-loanword vocabulary, the alveolar fricatives and stops /t, z, s/ assimilate preceding /i/ to the alveo-palatal segments [tɕ, ʥ, ɕ]. Consider the realisation of /s/ and /t/-final stems below in the non-past, infinitive and negative forms below.

(4) Non-past and infinitive verb stem alternations

Stem	Non-Past	Infinitive	Negative Non-Past (NP)[4]	
/tat-/	[tatsu]	[tatɕi]	[tatanai]	'stand'
/das-/	[dasu]	[daɕi]	[dasanai]	'put out'

The stem-final alveolar segments /t/ and /s/ undergo palatalisation preceding the vowel /i/ in the infinitive, realised as [tɕ] and [ɕ] respectively. I discuss the representation of this process further in Chapter 3. The voiced segments /z/ and /d/ have a palatal counterpart [ʥ] preceding /i/. While no verb alternations are available due to a lack of /z/ and /d/ final stems, one can consider the distributional evidence, in which only the sound [ʥ] is found preceding /i/. Further evidence of this is available from *rendaku* (sequential voicing), which is a process of voicing active in compounds. In a compound, *rendaku* affects the initial voiceless consonant of the second morpheme of a compound if no voiced consonant is found within either morpheme. Two examples are [ton] 'pork' + [ɕiru] 'soup'=[tonʥiru] 'pork bone soup' and [hana] 'nose' + [tɕi] 'blood = [hanaʥi] 'bloody nose'. The voiced counterpart of both [tɕ] and [ɕ] is uniformly [ʥ]. More conditions on the featural content and morphological structure of a word must be satisfied for *rendaku* to apply; see Vance (1987), Itō & Mester (1987) and Labrune (2012a) for further details. There is no voiced alveo-palatal fricative [ʑ] in Tokyo or

[3] The use of the term 'head' here does not seem to imply a licensing relation; the use of the term head by Kawahara (2015), discussed in more detail in Chapter 4, is different from a head in Government Phonology, introduced in Chapter 5.

[4] I use the abbreviation NP for glossing of the non-past suffixes throughout. Japanese has no overt morphosyntactic distinction between present and future tense.

Owari Japanese.[5] The alveopalatal segments [tɕ, ɕ, dʑ] also serve as the alveolar counterparts of consonants with secondary palatalisation, e.g. [pʲ], [bʲ] and so forth.

The alveolar stop /t/ also exhibits affrication to /ts/ preceding /u/. This is exemplified above in the alternation [tatsu]/[tatanai] 'stand-NP/-NEG'. This rule of affrication is idiosyncratic and has been termed a 'crazy rule' (Bach & Harms 1972). See Yoshida S. (2001) for one possible analysis of this phenomenon in Japanese. The segment [ts] may appear in other contexts in dialect words, as in Owari [oɕo:gats:ama] 'the new year'.

The voiced alveolars /d/ and /z/ have merged preceding /i/ and /u/ to [dʑi] and [dzu]. I do not consider this to be an issue of synchrony. In previous stages of Japanese, there was a four-way distinction between [dʑi], [dzu], [ʑi] and [zu]. This distinction is neutralised in Tokyo and Owari Japanese to a two-way distinction between [dʑi] and [dzu~zu]. The lost distinction is attested in missionary documents (Rodrigues 1603) and remains in dialects of Kyūshū and Shikoku (cf. Uwano et al 1989, Gotō 1983, Iwamoto 1983), but is lost in all Honshū dialects. Northeastern dialects further merge /d/ and /z/ preceding /i/ and /u/ as the contrast between these high vowels is neutralised following fricatives and affricates, giving [dʑï] in the Akita dialect for corresponding historical *[dʑi, dzu, ʑi, zu] (Hōjō 1982). In Tokyo Japanese, only [dʑi] occurs before /i/. Preceding /u/, [dz] and [z] are in relatively free variation, though Vance (1987:24) notes that [dz] reliably appears following the syllabic nasal and word-initially with [z] found intervocalically. I further point out that [dz] is found reliably in loanwords with geminated /z/, such as [gudz:u] 'goods'.

The glottal fricative /h/ also exhibits assimilation when preceding high vowels. When preceding /u/, /h/ is realised as [ɸ] as in [oɸuro] 'bath'. Preceding /i/, it is realised as the palatal fricative [ç] as in [açiru] 'duck'. Vance (1987:21, 2007) claims that innovative speakers may exhibit [ɸ] in other environments, however, such as [ɸiesuta] 'fiesta'.

The moraic nasal also exhibits assimilation to the following consonant or possibly to the preceding vowel. N assimilates in place and is realised as the labial nasal [m], alveolar nasal [n] or velar nasal [ŋ] preceding labial, alveolar or velar obstruents as in [kempo:] 'kenpo', [kanto:] 'Kanto region' and [giŋko:] 'bank'. When found word-finally as in /hoN/ 'book', N is realised either as a uvular nasal [N] or nasal vowel, with articulatory phonetic studies conflicting as to the status of this segment (cf.

[5] A distinction between [dʑ] and [ʑ] is maintained in parts of Kyūshū and Shikoku (Uwano et al 1989). See also Rodrigues (1603) for orthographic attestation of this distinction in Late Middle Japanese.

Vance 1987:34ff). In intervocalic position, the phonetic realisation of the moraic nasal has variously been described as a nasal glide [ɰ̃] (Vance 2007) or as a back nasal vowel [ũ] in careful pronunciation or as a homorganic nasal vowel in informal pronunciation, assimilating in place to the preceding vowel e.g. [hoõ] 'book' for <hoN> (Yoshida S. 2003). It is also commonly noted in the literature that in a syllable containing the syllabic nasal, the vowel preceding N also exhibits nasalisation, i.e. <hoN> 'book' is realised as [hõN] (Bloch 1950, Vance 2007, Labrune 2012a). As the exact nature of the moraic nasal as a consonant or vowel is perhaps in doubt, I crucially revisit the realisation of /N/ and the representation of this special mora in Chapter 6 and 8, where I examine its phonological behaviour with regards to accent assignment and spreading.

The final assimilation process discussed here is high vowel devoicing, which occurs in the Tokyo dialect (Haraguchi 1977) and other Eastern dialects, but does not occur in Owari Japanese (Keshikawa 1971, 1983; Terakawa 1985). In this process, the high vowels /i/ and /u/ are realised as voiceless [i̥] and [u̥] when found between voiceless consonants or between a voiceless consonant and the end of a word, e.g. [tsukeru] 'put on, intr.-NP' may be realised as [tsu̥keru]. I note that this process often leaves no trace of a vowel, as in the common realisation of orthographic <gakusei> 'student' as [gakse:], so devoicing in this instance is rather more like vowel syncope. Vowel devoicing is revisited briefly in Chapter 8.

I reserve discussion of coalescence until section 1.3. Let us now move onto the basics of pitch accent in Japanese.

1.2 Japanese pitch accent systems

In this section, I briefly discuss Japanese pitch accent. 'Pitch accent' typically refers to languages that encode contrastive accent using a fall in pitch (or F0) following the accented syllable (Kawahara 2015). Unlike stress languages, pitch accent is not iterative (i.e. no secondary accent) and may only be placed once within a word. Unlike tone languages, contour tones are not permitted in Japanese and the Low tone is never contrastive, i.e. there is no word *[è] which contrasts with an accented word such as [é] 'handle' in isolation.

I first discuss Tokyo Japanese (Haraguchi 1977, 2001; Kawahara 2015), which is the exemplar of a Tokyo-Type accent system (Kindaichi 1977). I then discuss the accent pattern of the Owari dialect (Mizutani 1960, Uwano 1977, Keshikawa 1983), which also has a Tokyo-Type accent system with a few crucial differences. The section concludes with a brief discussion of other accent systems, focusing on the Osaka dialect (Haraguchi 2001) and the Kagoshima dialect (Kibe 2010, Kubozono 2015b).

1.2.1 Tokyo Japanese accent

The Tokyo dialect has a distinction between words that are accented (e.g. /ínoʨi/ ‘life’) with the accent marked in the lexicon and words that are lexically unaccented (e.g. /sakura/ ‘cherry tree’), which receive word-final accent upon interpretation. According to Haraguchi (1977), accented moras are assigned a High tone. Other moras within the word are assigned High tone (H) if they precede the site of the accent or a Low tone (L) if they follow the site of the accent and on the initial mora, on which more below.

Following McCawley (1968:138), the Tokyo pitch accent system is typically called an *n+1* system, where *n* equals the number of syllables in a word and *1* refers to the additional unaccented pattern.[6] In much of the literature, it is assumed that tone is associated to moras based on this underlying accent specification. Consider the following data, which exemplifies accent minimal pairs and the n+1 pattern of Tokyo Japanese. Underlying lexical accent is marked with an asterisk mark in the data below (e.g. [é]) and high pitch is marked with an over-line. The examples in (5) exemplify accentual minimal pairs, while (6) exemplifies the n+1 accent possibilities in Tokyo Japanese. For clarity, I add an asterisk above lexically accented nuclei.

(5) Minimal pairs exhibiting initial and final accent (Kawahara 2015:448)

a. [káta] ‘shoulder’
b. [katá] ‘frame’
c. [kóto] ‘Japanese zither’
d. [kotó] ‘matter’
e. [káki] ‘oyster’
f. [kakí] ‘fence’

[6] This is not always accurate in longer words; I return to this issue in Chapter 4.

(6) Pitch Accent Patterns for Tokyo Japanese nouns (Haraguchi 2001:6)[7]

a. Unaccented words in citation form and with nominative suffix /-ga/

	Noun	Noun+NOM	Gloss
i.	[e]	[e ga]	'handle'
ii.	[ha ɕi]	[ha ɕi ga]	'edge'
iii.	[sa ku ra]	[sa ku ra ga]	'cherry tree'

b. Accented word patterns in citation form and with nominative suffix /-ga/

i.	[é]	[é ga]	'picture'
ii.	[há ɕi]	[há ɕi ga]	'chopstick'
iii.	[ha ɕí]	[ha ɕí ga]	'bridge'
iv.	[ká ra su]	[ká ra su ga]	'crow'
v.	[ko kó ro]	[ko kó ro ga]	'heart
vi.	[o to kó]	[o to kó ga]	'boy'

To account for the surface tonal patterns of Tokyo Japanese, Haraguchi (1977) claims that Tokyo Japanese has a basic tone melody of HL, where H is associated to an accented mora and L is associated to any mora after the accented mora if any are available. Haraguchi (1977) presents tone association over the entire word as an ordered process of high and low tone association (see also Kawahara 2015). First, a High tone (H) is assigned to the accented mora. If there is no accented mora, a word-final H is assigned by default. H is then assigned to all preceding moras. Following this process, a low tone (L) is assigned to the initial mora under a rule of Initial Lowering (Haraguchi 1977) or dissimilation (Haraguchi 2001), unless the initial mora itself is accented.[8]

[7] The accent system of Tokyo Japanese is by and large the same as Standard Japanese normative materials (e.g. NHK 2015). I typically refer to Tokyo Japanese. For more on the evolution of Standard Japanese and the variety spoken in Tokyo, see Shibata (1998), Carroll (2001) and Frellesvig (2010).

[8] The picture is more complicated when one considers heavy syllables. I revisit this in Chapter 8.

Accented words retain their accentuation wherever they are affixed with an accentless suffix, as in the examples shown above with the accentless nominative suffix /-ga/, e.g. /háɕi/ 'bridge' [háɕi]/[háɕiga] 'bridge, bridge-NOM'. Accentless words are assigned a word-final high tone in the absence of a lexical accent; this also applies to the nominative forms above, where neither root nor suffix has an accent, but the surface forms exhibit an inserted final accent e.g. /haɕi/ [haɕí] 'edge', /haɕiga/ [haɕigá] 'edge-NOM'. From here onwards, I differentiate lexically accented and unaccented forms with an asterisk or lack thereof in examples.

The relevance of the syllable is not seen in the above forms, as each syllable consists of only one mora. When considering bimoraic syllables, the syllable constituent is argued to be relevant for the accentuation patterns evidenced (McCawley 1968). First, consider the fact the second mora within a syllable cannot support a lexical accent. In other words, a word in the Tokyo dialect such as [ɕakáigaku] 'sociology' is perfectly well-formed, but *[ɕakaígaku] would be unacceptable.

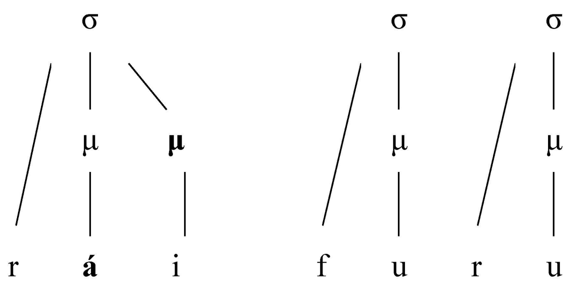
Second, consider the accent pattern of words containing four or more moras. As pointed out by Haraguchi (1991) and Yoshida Y. (1999), certain words with more than four nuclei exhibit default accent on the antepenultimate mora in native Japanese words, such as [murásaki] 'violet' or [hototógisu] 'lesser cuckoo' (Yoshida Y. 1999). McCawley (1968), Yoshida Y. (1999) and Kubozono (2008) also notes that this pattern is maintained for loanwords, such as [razánia] 'lasagne' and [purogúramu] 'program'. When the second half of a diphthong or long vowel is the antepenultimate mora, the accent is realised on the pre-antepenultimate mora. Consider the following loanword data from Kawahara (2015). I separate moras with a full stop.

(7) Accent on the pre-antepenultimate mora in loanwords (Kawahara 2015)

a.	[pa.i.ná.p.pu.ru]	'pineapple'
b.	[tá.k.ku.ru]	'tackle'
c.	[gu.rá.m.pu.ri]	'Grand prix'
d.	[ká.n.za.su]	'Kansas'
e.	[ka.ré.n.da.a]	'calendar'
f.	[pu.rí.n.se.su]	'princess'
g.	[su.nó.o.ke.ru]	'snorkel'
h.	[pá.a.pu.ru]	'purple'
i.	[rá.i.fu.ru]	'rifle'
j.	[ta.i.pu.rá.i.ta.a]	'typewriter'
k.	[ri.sá.i.ku.ru]	'recycle'
l.	[bu.ró.i.ra.a]	'broiler'

According to Kawahara, the existence of accent on the pre-antepenultimate mora in the above words is accounted for by considering the syllable: accent is assigned to the antepenultimate mora and interpreted on the head of the syllable, which is the pre-antepenultimate mora (Kawahara 2015:454ff). I show an example of this below, with the antepenultimate mora in [ráifuru] 'rifle'.

(8) Representation of [raifuru] 'rifle'



In the above word, it is assumed that accent on the pre-antepenultimate mora is derived from assignment of accent to the antepenultimate mora, which is not the first mora in the syllable. Accent is then interpreted on the first mora of the syllable. The syllable and its role, as well as the issues with the use of the syllable, are discussed further in Chapter 4 and 5. Let us briefly consider other dialect patterns before moving on to a discussion of coalescence.

1.2.2 Owari Japanese accent

The dialect of Owari is spoken in the city of Nagoya and in the Nōbi plain to the north of the city, including the city of Ichinomiya. While this area is roughly 300 km to the west of Tokyo, the accent system of Owari is largely identical, though the dialect differs in the association of L at the beginning of a word. According to Mizutani (1960), the first two syllables in Owari exhibit L in words composed of CV only syllables, as opposed to the pattern witnessed previously in the Tokyo dialect where L is associated only to the first syllable. Relevant data is presented below in (9).

(9) Tokyo and Owari nominal accent (Uwano 1977:284,290)

a. Tokyo noun accent patterns

Citation form	Noun-NOM	Gloss
* [ká bu to]	* [ká bu to ga]	‘helmet’
* [ko kó ro]	* [ko kó ro ga]	‘heart’
* [ka ga mí]	* [ka ga mí ga]	‘mirror’
[sa ku ra]	[sa ku ra ga]	‘cherry tree’

b. Owari noun accent paterns

Citation form	Noun-NOM	Gloss
* [ká bu to]	* [ká bu to ga]	‘helmet’
* [ko kó ro]	* [ko kó ro ga]	‘heart’
* [ka ga mí]	* [ka ga mí ga]	‘mirror’
[sa ku ra]	[sa ku ra ga]	‘cherry tree’

1.2.3 Spreading of H and assignment of H

Intriguingly, the regressive spread of H tone and L tone assignment patterns shown above are seemingly sensitive in both the Tokyo and Owari dialects to syllable structure. The assignment of L in the Tokyo and Owari dialects may be violated, with H spreading further than shown above if the initial or second syllable is heavy. Consider the two patterns from the Tokyo dialect shown below.

(10) Tokyo Pattern A: High tone spreading until the initial mora

[ko o ri]	‘ice’
[bjo o ki]	‘illness, sick’
[ka i te]	‘buyer’
[to i ɕi]	‘whetstone
[ba t ta]	‘grasshopper
[ke ŋ ka]	‘quarrel’

(11) Tokyo Pattern B: H spread affecting all moras except initial, unless heavy

[sa ku ra]	'cherry tree'
[ko o ri]	'ice'
[bjo o ki]	'illness, sick'
[ka i te]	'buyer'
[to i ɕi]	'whetstone
[ke ŋ ka]	'quarrel'

The association of L to the initial mora is universal in Tokyo Pattern A, but suspended in Tokyo Pattern B when the initial syllable is heavy. In Owari Japanese, the association of L affects the initial two moras unless one of these moras is found within a heavy syllable, c.f. Owari [sàkùrá] 'cherry tree' versus [tóómó] 'rice field'. Crucially, this effect is absent when the heavy initial syllable contains a geminate, e.g. Owari [tèp:pó] 'pistol', Tokyo [kòp:ú] 'cup;. I provide a full analysis of this issue in Chapter 8, but refer to high pitch or tone spread patterns in relevant portions throughout this thesis.

1.2.4 Other Japanese accent patterns

Tokyo-type dialects are quite widespread in Eastern Japan, but many dialects exhibit different accent assignment patterns. The Kansai dialect is one example of a dialect with more patterns than Tokyo. This dialect displays a *2n+1* accent pattern (Haraguchi 2001). As with Tokyo, any mora may be lexically accented in Osaka or a word may be unaccented. The difference between the two dialects according to Haraguchi is the difference in tone melodies – Tokyo has only a HL tone melody while Kansai has a LHL and a HL pattern. Words having a HL melody exhibit H on all moras preceding the site of the accent such as [kámín**á**rì] 'lightning', with the lexically accented nucleus shown in bold. Other words have an LHL pattern and exhibit only L preceding the site of an accent as in [nòkò**gí**rì] 'saw'. These tone melodies are also found in unaccented words, such as /sakura/ 'cherry tree' which is realised as [sákúrá], and /suzume/ 'sparrow' which is realised as [sùzùmé] (Haraguchi 2001:17).[9] I note that

[9] The unaccented nature of these words becomes apparent when an accentless suffix is added to the citation forms and accent is placed word-finally, e.g. [sákúrágá] 'cherry tree-NOM' and [suzumegá] 'swallow-NOM'.

another difference between the two dialects is that Kansai Japanese has no rule of low tone insertion on the initial mora.

The Kagoshima dialect of Japanese has fewer patterns than Tokyo. This dialect exhibits two accent patterns, with assignment on either the ultimate or penultimate syllable (Kibe 2010, Kubozono 2015b). Consider the following data for two-syllable and three-syllable words composed of only light syllables, with both penultimate and ultimate accent exemplified.

(12) Kagoshima Japanese nouns (Kibe 2010:28)

a.	[hána]	'nose'
b.	[haná]	'flower'
c.	[sakúra]	'cherry tree
d.	[kokoró]	'soul, heart'

The relevance of the syllable in this dialect becomes apparent upon examination of words with heavy syllables. Consider the following data from Kubozono (2015) exhibiting diphthongs and their patterning.

(13) Kagoshima Japanese accent in nouns with heavy syllables (Kubozono 2015b)

a.	[nimaigái]	'bivalve, lamellibranch'
b.	[magói]	'black carp
c.	[hantái]	'opposition, objection'
d.	[akágai]	'arch shell'
e.	[kazegúsui]	'cold medicine'
f.	[kémui]	'smoky'

In the above words, accent is found on the ultimate syllable in the words shown in (11a-c), while accent is on the penultimate syllable in examples (11d-f). In the Kagoshima dialect, the second mora within a syllable is not a unit of accent assignment, nor is it counted for accent assignment. The syllable is the only unit of accent assignment. If this dialect counted only moras, accent would only be found on the penultimate or ultimate mora within the final syllable in (11a-f), i.e. [akágai] 'arch shell' would be an impossible form.

We have seen above a short overview of accent in Japanese, with more on the Tokyo and Owari dialects covered later in this thesis. A fuller discussion of dialect accent is found in Haraguchi (1977).

1.3 Coalescence

Another phenomenon that is dealt with in this thesis is the phenomenon of coalescence in Owari Japanese. Coalescence in the phonological literature refers to the fusion of two segments, be they consonantal or vocalic. I focus here only on vowel coalescence. Vocalic coalescence, known as *renboin yūgō* (adjacent vowel fusion) in Japanese, occurs in many dialects. In the Owari Japanese dialect, the vowel sequences /ai/, /oi/ and /ui/ fuse and give rise to the vowels [æ:], [ø:] and [y:]. This is pattern exemplified below with comparative Standard forms.

(14) Owari coalescence[10]

	Owari	Standard	Gloss	
a.	[dæ:koN]	[daikoN]	'daikon'	
b.	[æ:biki]	[aibiki]	'affair'	
c.	[kæ:]	[kai]	'clam'	
d.	[ø:]	[oi]	'nephew'	
e.	[kø:]	[koi]	'carp'	
f.	[sy:ka]	[suika]	'watermelon'	(Ebata 2013)
g.	[ky:]	[kui]	'post'	(Ebata 2013)

The outcome of coalescence does not always give rise to an expanded vowel inventory. Coalescence is found in the dialect of certain Tokyo dialect speakers and is typified as 'casual' speech. (Hasegawa 1976; Kubozono 2015b). Coalescence in Tokyo also affects /ai/, /oi/ and /ui/, but coalescence here produces the vowels [e:], [e:] and [i:], with no new contrasting vowels such as *[y:]. Consider the data below.

(15) Tokyo Coalescence (Kubozono 2008:152, transcription modified)

	Tokyo	Standard	Gloss
a.	[ite:]	[itai]	'painful-NP'
b.	[suge:]	[sugoi]	'great-NP'
c.	[atɕi:]	[atsui]	'hot-NP'

Coalescence is worth investigating for two reasons. First, coalescence has received some attention in the descriptive literature on Japanese, as in the description of the Owari dialect given by Keshikawa (1983), but there is no in-depth work available

[10] Unless otherwise noted, Owari data is drawn from field notes and recordings made in April 2013 in Ichinomiya City, Aichi prefecture. I thank Teranishi-san, Emori-san and especially Yamaguchi-san for their assistance and discussion of the Owari dialect.

from a theoretical point of view on Owari Japanese.[11] The only available analysis of Owari Japanese is a cursory examination of three adjectives given in Yoshida Y. (1996). I deal with the theoretical analysis of Owari and Tokyo Japanese coalescence in Chapter 3 and 7.

1.3.1 Owari coalescence as a marked system

The Owari dialect is of particular interest on typological grounds as coalescence here creates the front and round vowels [ø] and [y]. The work of Casali (2011) has examined cross-linguistic strategies of hiatus resolution, one of these strategies being coalescence. He claims that coalescence which produces the front round vowels [y] and [ø] is marked and uncommon. I agree that coalescence which produces front-round vowels is marked, and I extend on this research below.

I first examine the typology of coalescence cross-linguistically in section 1.3.2, considering languages which exhibit coalescence which produces front-round or fronted vowels. In 1.3.3, I then examine the outcome of coalescence in Japanese dialects by presenting previous typological work from Uwano et al (1989). I complement this typology in 1.3.4 with further classification of coalescence systems based on data drawn from fieldwork recordings by Kindaichi & Shibata (1966-1972).

1.3.2 A cross-linguistic view of vocalic coalescence

Casali (1996, 2011) provides discussion of all possible hiatus resolution processes, looking at diphthongisation, glide insertion, vowel elision and vowel coalescence. I focus here only on vowel coalescence. Casali (2011:1439) first proposes that height coalescence is most common, where a non-high vowel and a high vowel combine to form a non-high vowel, as in Xhosa /wa-inkosi/ [wenkosi] 'of the chiefs'. In contrast, he claims that coalescence which produces front round vowels, or rounding coalescence (i.e. /i-u/ > [y]), is less common than height coalescence (Casali 2011:1440).

The only examples of rounding coalescence presented by Casali are Rotuman, Korean (de Haas 1988) and Obolo (Faraclas 1982) as languages where this type of coalescence occurs. There are a few problems with the works which these are drawn from. First, the data provided for Obolo by Faraclas (1982:72) contains only one word which possibly exhibits rounding coalescence. This example is [idʒo] 'bad' + [etip] 'news' = [idʒœtip] 'bad news'. This outcome is variable, but Faraclas does not provide

[11] Other dialects have been examined in brief. Koizumi (1981) examined coalescence within Shizuoka Japanese using binary features, while Kubozono (2015b) analyses coalescence in diachrony and synchrony for Tokyo Japanese using binary features and a linear rule.

further details or data, and claims that it only occurs with the vowels [o] and [e]. I have been unable to source any further work on Obolo phonology, which also known as Andoni.

Second, the description of Korean coalescence must be amended. De Haas (1988) draws on the analysis of Sohn (1987), who claims that the vowels [y] and [ø] are products of coalescence from the glide-vowel sequences [wi] and [we]. See the data below.

(16) Coalescence data from Sohn (1987)

Pre-Coal.	Coalesced form	Gloss
/kwemul/	[kømul]	'monster'
/weka/	[øka]	'grandparents'
/wisen/	[üsen]	'hypocrisy'
/wihəm/	[yhəm]	'danger'

However, this process has been misrepresented. It is in fact a process of diphthongisation affecting not only the vowels [y, ø] but also other vowels which occurred in the 20th century (Kim 1996, Lee & Ramsey 2011). According to Lee & Ramsey, coalescence did occur during the recent past, perhaps around 1600-1800 C.E., but the results of coalescence are lost in modern Korean. Korean also has a process of umlaut which formerly produced the vowels [y] and [ø], but these vowels are no longer produced.[12] See Lee & Ramsey (2011) and Shin, Kiaer & Cha (2012) for more on modern Korean.

The final proposed case of coalescence is Rotuman (de Haas 1988). De Haas examines complete and incomplete nouns in this language (Churchward 1940), proposing that coalescence is present. However, the data is misanalysed – the cases of coalescence presented by de Haas are in fact cases of umlaut. The relevant alternation is seen in the complete form of 'orange' [mori], which is realised in the incomplete form as [mør] (Schmidt 2003). Further data and discussion can be found in Cairns (1977). This alternation is not the only one found in the language, but there are no cases of clear coalescence provided by de Haas (1988). I therefore discard this language as a case of rounding coalescence.

[12] From what I gather, the vowels [y] and [ø] may still be heard on Korean news channels, but this is seen by speakers as unacceptable in modern South Korean varieties (Soung-U Kim, p.c.). Diaspora varieties also do not seem to retain these vowels (Simon Barnes-Sadler, p.c.). I leave the possible existence of these vowels in dialects to further research.

I have examined various languages for cases of coalescence producing front-round vowels and have found only three further reliable examples of languages with rounding coalescence, shown in Table 1. The language is listed in the first column, with family and geographical location listed in the second and third column. Co-ocurring phonological processes are listed in the third column.

Table 1: Languages exhibiting clear cases of rounding coalescence

São Miguel Portuguese	Romance Azores, Portugal	*oi > ø* [noit] 'night' (Lisbon dialect) [nøt] (São Miguel dialect) Co-occurs with shift of *i>y,* e.g. [uva] (Lisbon) > [yva] (São Miguel) 'grape', effect of a chain shift (Silva 2005:4)	Silva (2005:3ff)
Khorchin Mongolian	Mongolic S.E. Inner Mongolia, China	*ai > ɛ:* Orthographic <ail> Khorchin [ɛ:l] 'camp' *ui > y*: Orthographic <uil> Khorchin [y:l] 'work' *oi>ø:* Khalkha <hoid> 'north> Khorchin [hœ:ʃ] 'northwards' Word internally, similar change by diachronic lenition/umlaut (Janhunen 2012:46ff)	Janhunen (2012:37ff)
Ding, Yans	Bantu Group B80 (Kwilu Bantu) DR Congo	Coalescence found noun prefix-root boundary e.g. /mu-ím/ [myým] 'back' (Ding) /mu-ín/ [mwýn] 'beak' (Yans) Co-occurs with diachronic umlaut and synchronic umlaut in the applicative, which fronts *{a, u, o}* to *æ/ɛ, y, ø* e.g. Ding /-bór-il/ 'produce-APPL' [bǿ:r] (B&M 2014:220)	Bostoen & Muluwa (2014:225)

These languages exhibit rounding coalescence, but only in very specific circumstances. São Miguel Portuguese exhibits the front round vowel [ø] as a product of /oi/ coalescence (Silva 2005), but it is restricted to positions where the diphthong [oi] is found in European (Lisbon) Portuguese. It is unclear if /ai/ and /ui/ are ever affected by coalescence (e.g. Lisboan [pai] 'father' and [fui] 'went') as Silva does not mention these diphthongs.

Moving to Khorchin Mongolian, it is clear from the discussion in Janhunen (2012) that /ai/ /oi/ and /ui/ may fuse to [ɛ:], [ø:] and [y:]. The examples provided by the author are few, so little can be said about the productivity of coalescence in this language. Further examples of the front round vowels may be produced by 'breaking' of palatal consonants which the author discusses, though Janhunen provides no clear transcription of any particular words. Denwood (1997:222) provides some discussion of palatal consonants as triggers of fronted vowel creation as in [æmʲ] 'life', [mœrʲ] 'horse' and [xyvʲ] 'individual', though the speakers the author consulted are identified as Khalkha Mongolian speakers. Regardless, it is clear that in Khorchin Mongolian and perhaps some Khalkha speakers, coalescence and palatal consonants may trigger the creation of front round vowels.

In certain dialects of the Kwilu Bantu languages Ding and Yans, coalescence seems to be productive for the sequence /ui/ which results in [y:] or [y], according to discussion from Bostoen & Muluwa (2014). The focus of the work, however, is on umlaut which produces [y], [ø] and [æ], among other vowels. Umlaut is largely triggered synchronically by the applicative verbal suffix /-il/. While it is possible that the languages Ding and Yans exhibit coalescence of /ai/ and /oi/ in other nominal forms, no further evidence is available.

Further examination of other language families must be done, but many sources describe vocalic phenomena only in passing. Some Tibetic languages, for example, may have front round vowels due to coalescence, but it is unclear whether this is coalescence or diphthongisation or another process entirely. See van Driem (2001) for an overview of these languages. Many language families which exhibit coalescence productively seem to avoid the production of front round vowels at all costs. Gliding or elision often applies where a front-round vowel might be expected as an output. Both hiatus resolution processes operate in Xhosa (Casali 2011:1442ff), where a round vowel in the V_1 position will become a labial glide, and a front vowel in the same position will be elided, cf. /esisu-ini/ > [esiswini] 'stomach-LOC' and /ni-odʒa/ [nodʒa] 'you roast'. Gliding applies productively as a hiatus resolution process when V_1 is a front *or* round vowel in many other Bantu languages, such as Bemba (Kula 2002). Consider also the dialects of Arabic, in which coalescence has applied to /ai/ and /au/ to create the vowels [e:] and [o:] in many dialects (cf. Naïm 2016 in Beirut Arabic, Woidich 2016 on Cairene Arabic), but which has never affected the vowel sequences /ui/ or /iu/. I hypothesise for the moment that gliding is preferred over the creation of a new vowel such as [y]. I presume that gliding applies wherever possible, with new vowel contrast occurring only where no other option is available. At least in Japanese, the sequences /ai/, /oi/ and /ui/ could never exhibit gliding; /a/ has no glide counterpart and there is an absolute ban on /CwV/ sequences in most modern Japanese dialects. Theoretically, gliding could otherwise give rise to /aji/, /oji/ and /uji/.

In contrast to the above languages, Owari Japanese productively creates [y] and [ø] from the vowel sequences /oi/ and /ui/ at a morpheme boundary, while lacking any interference from processes such as umlaut. Coalescence occurs nearly wherever the diphthong /ai/, /oi/ and /ui/ are present in Tokyo Japanese. Owari Japanese also serves as a more readily described language with some data available, although to my knowledge no full work on this dialect has appeared in English. Work on diachrony is available in Keshikawa (1971) and Hikosaka (1994) on the Edo period (ca. 1600-1850 C.E.) Owari dialect. Discussions of the modern character of the Owari Japanese include Keshikawa (1983), Terakawa (1985), Yamada & Niwa (1989), Inukai et al (2011), Ebata (2013), and Hikosaka (2014). The only theoretical work which analyses the Owari dialect to date is Yoshida S. (1996), in which three adjectives in Owari Japanese are briefly discussed. I provide a full analysis of coalescence in chapters 3 and 7.

To contribute to the above discussion, I provide a typology of coalescence in Japanese dialects in the following section. I begin by reviewing a Japanese phonological survey given in Uwano et al (1989). I then complement this survey by providing tables of Japanese dialect coalescence outcomes based on recordings from *Nippon Hōsō Kyōkai* (the national Japanese Broadcasting Company, typically known as NHK) from Kindaichi & Shibata (1966-1972). I will show that the dialect of Owari is not the only Japanese dialect which exhibits rounding coalescence.

1.3.3 Dialect Phonology Survey

Let us first examine the results of the phonology survey presented by Uwano et al (1989). To accompany the Japanese Dialect Dictionary (Fujiwara 1989), Uwano and his co-authors presented a summary of phonological changes to each consonant, vowel and syllable where they differed from the standard. Here, I focus only on the results presented for the diphthongs /ai/, /oi/ and /ui/. I make no claim that coalescence is regular in many dialects, but I only note the attested patterns that occur.[13] Consider first the map in Figure 1, which shows the three main islands of Japan and their prefectures.

[13] This is the case in the Akita dialect – it is described as exhibiting coalescence of /ai/ to [ɛː] by Satoh M. (1982) as well as regular coalescence of /oi/ to [eː] and /ui/ to [iː], but examination of data shows many exceptions to coalescence (cf. Hōjō 1968). The same facts apply to the Niigata dialect (Kenmotsu 1980, 1983), where coalescence does not apply productively, cf. Niigata [maɪnichi] 'everyday' but [wakɛː] from /waka-i/ 'young-NP'.

Honshū is the largest island. Shikoku is found to the south of the main island composed of Ehime, Kagara, Tokushima and Kochi prefectures. Kyūshū is found in the south-west. The island of Hokkaidō, the Ryukyuan islands such as Okinawa and minor islands are excluded from the map and from discussion.[14]

Figure 1: The prefectures of Honshū, Shikoku and Kyūshū[15]

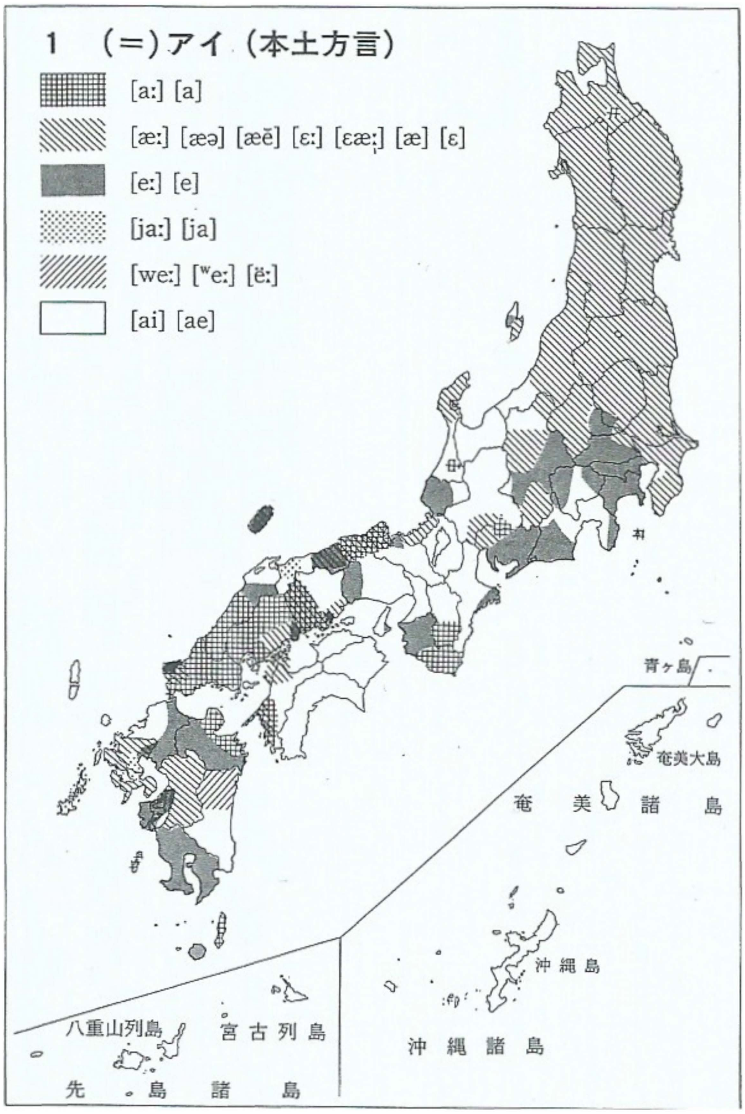
Now consider the following three maps in Figures 2, 3 and 4 from Uwano et al (1989). Figure 2 shows the changes to /ai/ and their geographic spread, while Figure 3 shows

[14] I do not discuss the dialects of Hokkaidō in the north of Japan nor the dialects and languages in the Ryukyuan islands to the southwest of Kyūshū. Hokkaidō displays a mixture of dialect features due to waves of migration from mainland Japan. Ryukyuan languages are from a separate language family. For grammatical sketches, see Iitoyo, Hino & Satō (1982-1986), Shibatani (1990) and Tranter (2012).

[15] Modified from public domain map drawn from Wikimedia (Tokyoship, 2016) https://commons.wikimedia.org/w/index.php?curid=15683093

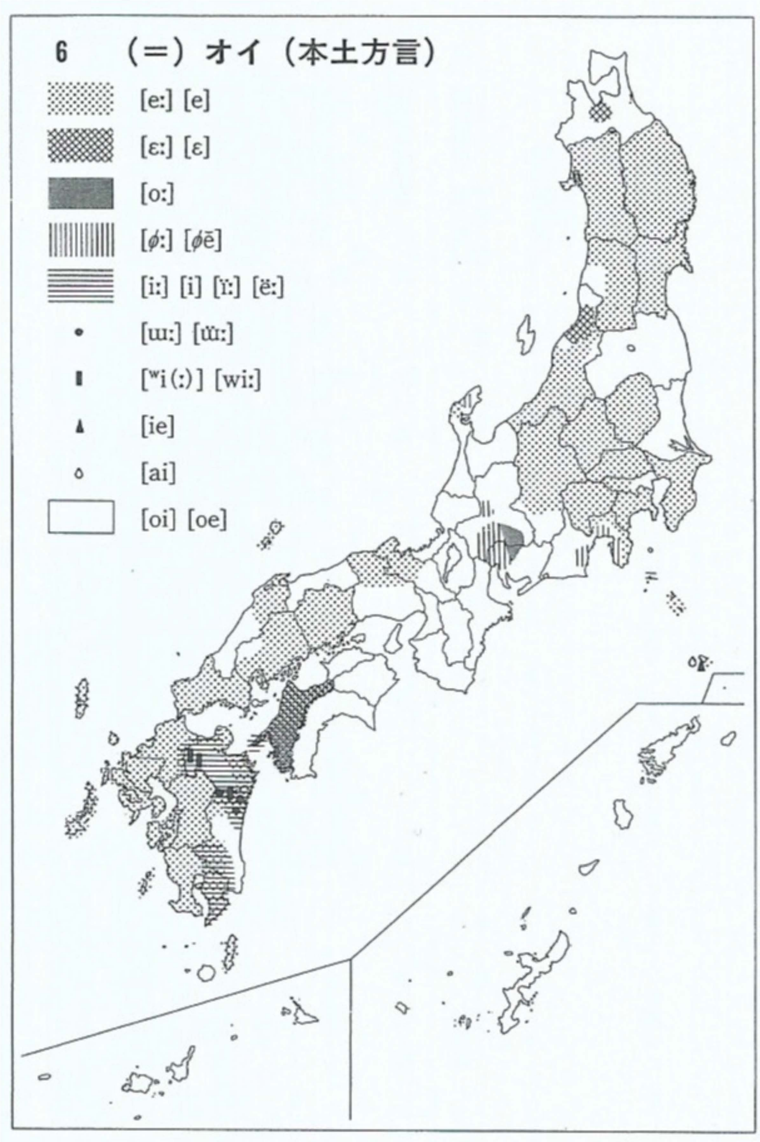
outcomes for /oi/ and Figure 4 is the map for /ui/ outcomes. I focus my discussion on the changes which can truly be considered coalescence where features from each input vowel are found in the output vowel, e.g. where /ai/ becomes a mid vowel [e], [ɛ] or [æ]. Changes such as /ai/ > [a:] may be cases of compensatory lengthening or total assimilation, while changes such as /ai/ > [ja] may be metathesis, or perhaps an outcome of multiple sound changes, (i.e. /ai/ > *[æ] > [jæ] > [ja]). I therefore exclude these outcomes from the discussion below, as they are not clear cases of coalescence.

Figure 2: Dialect outcomes of /ai/ in Honshū, Shikoku and Kyūshū dialects (Uwano et al 1989:3)



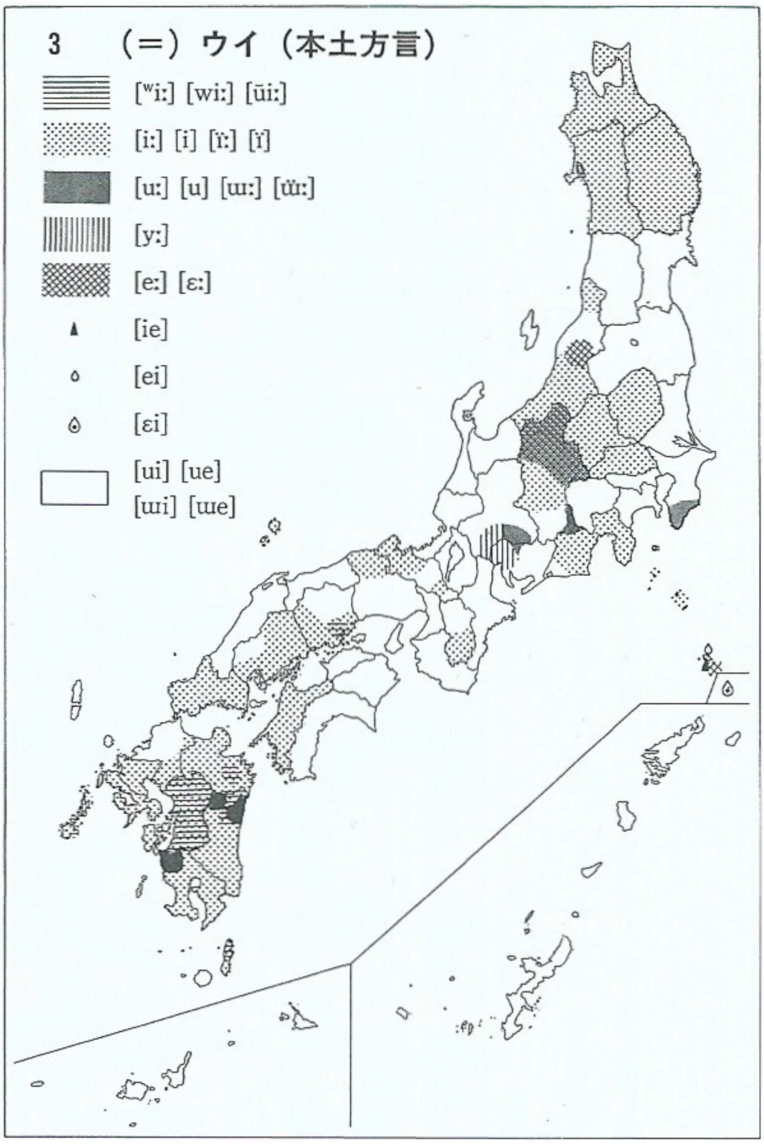
In Figure 2, the coalescence of /ai/ to a low-mid front vowel such as [ɛ] or [æ] (marked in right-downward diagonal stripes) is found in locations across the nation. Examining Honshū, this result is found in the northeast Tohoku region and scattered across the rest of the island in places such as Owari in Aichi prefecture, Gifu prefecture, Nagano prefecture, Ishikawa prefecture and Okayama prefecture. Outside of Honshū, this change is also found in Nagasaki prefecture and Kumamoto prefecture in western Kyūshū as well as the northwestern portion of Ehime prefecture in Shikoku. See Uwano et al (1989:2) for an exhaustive listing of locations where [æ], [ɛ] and other variants are reported. The outcome of the mid vowel [e], a vowel found in the Standard five-vowel system, is also found throughout Japan, shown above in solid grey. This pattern is notably adjacent to those areas where /ai/ gives rise to [ɛ/æ]. Shikoku, portions of Kyūshū and central Honshū remain areas where /ai/ is unaffected by coalescence.

Figure 3: Dialect outcomes of /oi/ in Honshū, Shikoku and Kyūshū (Uwano et al 1989:15)



Turning now to /oi/ in Figure 3, the realisation of [øː/øə] marked with vertical lines as found in Owari is much more limited in scope than [æ/ɛ] seen in Figure 2, restricted only to central Honshū. Uwano et al (1989:15) describe this vowel as occurring only in portions of, within Shizuoka prefecture in Fuji City, Shizuoka City and Matsusaki city, in the Owari region of Aichi prefecture and in southern Gifu prefecture in the area bordering the Owari region. The map also portrays a small portion of Ishikawa prefecture as having this change, but no mention of it is made in the text. The majority of dialects exhibit /oi/ realised as [e:] as in the Northeast of Honshū, marked with black dots on the map. This vowel sequence is also realised as [ɛ] in Shikoku's Ehime prefecture, shown in crosshatch.

Figure 4: Dialect outcomes of /ui/ in Honshū, Shikoku and Kyūshū (Uwano et al 1989:10)



Finally, turning to /ui/, we see that [y:] is extremely restricted according to the survey by Uwano et al (1989:10). It is found only in the Owari area in Aichi prefecture and the portions of Gifu prefecture immediately bordering this region. The only other comparable vowel cited in the text is one report of [ɯ̈] in Miyazaki prefecture not shown on the map, which Uwano et al (1989) note may in fact be a centralised vowel [ï]. In the majority of the country, /ui/ is realised as [i:] if it is coalesced at all, e.g. [sa:mi:] for Standard [samui] 'cold-NP' (Niigata, Uwano et al 1989:9).

Based on the above discussion, the only dialect which has the vowels [æ:], [ø:] and [y:], as in the Owari dialect, can be found in Gifu prefecture directly across the prefecture border within the same geographic plain, the Nōbi plain. Some dialects also exhibit [æ] and [ø], as in Shizuoka and Ishikawa. However, it is necessary to extend this typology based on other sources.

1.3.4 Extended typology based on spoken speech

I now present a new typology of coalescence drawn from Kindaichi & Shibata (1966-1972). Provided in the volumes of this work are transcriptions of recordings from the 1950s with accompanying mini-LPs providing audio for parts of each session. A total of 81 recording locations are represented throughout Honshū, Shikoku and Kyūshū.[16] These recordings show a slightly different spread for coalescence compared to the results from Uwano et al (1989). Recordings were made in remote locations with older male and female speakers who had lived in the area their entire lives. These recordings are not representative of the entire region in which they are found, but they provide an alternative view to the typology presented by Uwano et al (1989), which is based on dictionaries, grammar sketches and the like. I do not present the maps which show the recording locations below, but they are available in the volumes of Kindaichi & Shibata (1966-1972).[17]

Each location point represents one variety at one point in time, and I present the coalescence systems drawn from each recording below. Where a prefecture is represented by more than one recording location, I denote the systems with Location 1, Location 2, and so forth. I label each location with a coalescence pattern, with the labelling key shown below. The results drawn from the recordings are shown in the following tables, Table 2, 3 and 4. Those systems which exhibit different results with regards to rounding coalescence are bolded.[18]

[16] Further recordings are from Hokkaidō, the Ryukyuan archipelago and minor outlying islands of Japan.
[17] The copies available to me were in a fragile condition so I did not attempt to scan the maps from the source material, though recent reprints of the material would be scannable.
[18] I do not discuss the diachronic coalescence of /au/ to [ɔ:], though this change is found in the recordings of the Niigata dialect. See Kenmotsu (1983) and Ohashi (2002) for more. I also exclude separate labels for systems which do not coalesce /ui/ versus those which coalesce /ui/ and produce [i:]. I focus here on dialects which do or do not create rounding coalescence.

(17) Proposed coalescence systems

A	Exhibits /ai/ to [e] or long variant
B	Exhibits /ai/ to [ɛ/æ] or long variant
C	Same as B, also exhibits /oi/ to [ø] or long variant
D	Same as C, also exhibits /ui/ to [y] or long variant
N/A	No coalescence attested

Table 2: Honshū prefectures and coalescence (Kindaichi & Shibata 1966-1972)

Prefecture	**Coalescence system**
1. Aomori	Location 1 and 2: System B
2. Iwate	Location 1 and 2: System B
3. Miyagi	System B
4. Akita	System B
5. Yamagata	Location 1 and 2: System B
6. Fukushima	Location 1: N/A, Location 2: System B
8. Ibaraki	N/A
9. Tochigi	N/A
11. Gunma	System B
12. Saitama	System B
13. Chiba	Location 1 and 2: System A
14. Tokyo	N/A
15. Kanagawa	System A (/ai/ and /oi/ to [e:])
16. Niigata	Location 1, 2 and 3: System B; (Also retention of [ɔ:] in Location 2)
17. Yamanashi	Location 1: N/A; Location 2: System A
18. Nagano	Location 1 and 2: System A; Location 3: N/A
19. Toyama	Location 1: N/A; Location 2: N/A
20. Ishikawa	**Location 1: System C** Location 2 and 3: System B
21. Fukui	Location 1 and 2: N/A
22. Gifu	Location 1: System C, but possibly D as location reported to have [ɯ̈] Location 2: System B Location 3: System C
23. Shizuoka	**Location 1: System C** Location 2: System B
24. Aichi	Location 1: System D Location 2: System B
25. Mie	Location 1: N/A, but lengthening of V_1 Location 2 & 3: N/A

26. Shiga	Location 1: System B Location 2: System B
27. Ōsaka	N/A
28. Kyōto	N/A
29. Hyōgo	Location 1: System B Location 2: System B, /oi/>[e:], /ui/>[i:]
30. Nara	N/A
31. Wakayama	Location 1 and 2: N/A
32. Tottori	N/A
33. Shimane	Location 1 and 2: System B
34. Okayama	**System D** e.g. [samyi] 'cold-NP'
35. Hiroshima	Location 1 and 2: System B
36. Yamaguchi	Location 1 and 2: Unclear, /ai/ > [aɛ~ai~a:] reported

Table 3: Shikoku prefectures and coalescence (Kindaichi & Shibata 1966-1972)

37. Tokushima	N/A
38. Kagawa	N/A
39. Ehime	Location 1 and 2: N/A
40. Kochi	Location 1 and 2: N/A

Table 4: Kyūshū prefectures and coalescence (Kindaichi & Shibata 1966-1972)

41. Fukuoka	Location 1, 2 and 3: N/A
42. Saga	Location 1: System B Location 2: N/A, /ai/ > [ja]
43. Nagasaki	Location 1: N/A Location 2: N/A, /ai/ > [ja]
44. Kumamoto	Location 1 and 2: N/A
45. Oita	Location 1 and 2: N/A
46. Miyazaki	Location 1 and 2: N/A
47. Kagoshima	Location 1, 2 and 3: N/A

The resulting typology drawn from the texts and notes in Kindaichi & Shibata (1966-1972) is broadly the same as the typology presented by Uwano et al (1989). Quantitatively, I show percentages of each pattern below in Table 5. I count the Yamaguchi dialect in the other section, as the data is variable. I include the Gifu dialect noted above as a C system, as it is unclear what [ŭ̈] represents, though it is likely [y] based on Uwano et al (1989).

Table 5: Number and percentage of occurrences for each system

	# of occurrences	Percentage of total[19]
No coalescence	40	49%
System A w/[e]	6	7%
System B w/[æ/ɛ]	28	34%
System C w/[æ, ø]	4	5%
System D w/[æ, ø, y]	2	2%
Other (Yamaguchi)	2	2%
Total	82 recordings	

The most common pattern throughout Japan is to not have coalescence at all, with 49% of location recordings exhibiting no evidence of any alteration. Of the locations which contain coalescence, System B is the most widespread, where /ai/ coalesces to [æ] or [ɛ]. Some of these locations also have coalescence of /oi/ to [e:] and /ui/ to [i:], though not all location chapters contain description or data which accounts for these vowel sequences.[20] The least common patterns are the A, C and D patterns, but crucially the recordings examined show a slightly expanded presence of system C and D coalescence to what was reported earlier in Uwano et al (1989)

1.3.4.1 Some outcomes from the above typology

I have highlighted a few major differences in bold above. First, one Shizuoka recording location and one Ishikawa recording location exhibited System C coalescence, where /ai/ coalesces to [æ] or [ɛ] and /oi/ to [ø] or [œ]. Each prefecture was not represented as having this system in Uwano et al (1989). Most surprisingly, we find the occurrence of System D coalescence in not only Aichi prefecture (more specifically the Owari area), but also in Okayama prefecture in Western Honshū.[21] I searched the literature for further discussion of System D coalescence dialects outside of these recordings, but there is little information available. There are traces of further dialects containing System D coalescence in Nagano prefecture (Mase 1983), and Shizuoka prefecture (Hirayama & Ooshima 1975), but these are noted only in passing as part of larger descriptions on Japanese dialects. No data is available to substantiate these claims. Furthermore, maps from the National Institute for Japanese (NINJAL)

[19] Percentages are rounded to a whole percentage point and so these percentages do not add to 100%.
[20] Some discussion of these systems is available in Mase (1975:115) as well as the chapters in Iitoyo, Hino & Sato (1982-1986).
[21] While this dialect offers tantalising similarities to the Aichi dialect, I have been unable to find more information on this dialect. Transcriptions from the dialect of Futakawa 20 km to the north (Fujiwara 1977) shows no evidence of this coalescence system. The recording location is the remote Kojiro village within the Katsuyama district of Maniwa City. According to the recording notes, the village had an approximate population of 690 people in 1955.

Language Atlas of Japan project (NINJAL 1966-1974) show evidence of /oi/ giving rise to [ø] in further areas such as Tango in northern Kyōto prefecture and Tajima in northern Hyōgo prefecture (cf. Map 24). Unfortunately, the finer details in these maps are lost, as the transcription methods used for these maps do not differentiate between certain segments. The segments [e], [æ] and [ɛ] are all transcribed as <e> (cf. Map 21 for realisation and variation of Tokyo [arai] 'rough'), and no words surveyed contain the diphthong /ui/.[22] I will take up the issue of searching for further System C and D dialects in the future.

1.3.4.2 Implicational universal and possible mergers?

One interesting outcome of the typological investigation above is that there is an implicational universal regarding what system is possible within Japanese dialects. If a dialect has [y], it has [ø] and [æ], but the reverse is not true: a dialect with [æ] does not necessarily have [ø], with even fewer dialects exhibiting [y]. In a sense, [y] is the most marked vowel, while [ø] is relatively less marked and [æ] or [ɛ] is the least marked outcome as it has the widest distribution.

Another interesting pattern which I note is that some C dialects exhibit the coalescence of /ui/ to [i:], as pointed out for portions of Shizuoka city in Shizuoka prefecture by Mase (1975) and Gifu prefecture (Uwano et al 1989), while some B dialects realise /oi/ as [e:] and /ui/ as [i:] as in Hamamatsu city in Shizuoka Pref. (Mase 1975). It is possible that System B and C dialects were once System D dialects, losing the vowels [ø] and [y] through inventory simplification. If we take this possibility seriously, it implies that the system seen in Owari and Okayama was once more widespread. I believe it is reasonable to assume that dialects have gone through a system of coalescence simplification. This would mean that a system D dialect became a system C dialect through simplification of [y] to [i], giving a system C dialect where /ui/ is now realised as [i] or some other variant.[23] This pattern is indeed verified in the speech of younger Owari speakers, where the reflexes of /ai/ and /oi/ are [æ:] and [ø:] as in older Owari speakers. The vowel [y:] is lost, and [i:] is found in its place, as in [sami:] 'cold-NP' (Field notes, April 2013).[24] This change can be assumed for the Gifu dialect, which shows variation between system C and system D. This analysis also

[22] Some of the original survey cards have been digitised and are available online. Those for Map 21 do show transcriptions of [ɛ] and [æ], but this distinction is not reflected in the map. I leave a fuller examination of these transcriptions to the future.

[23] Through the lens of Element Theory introduced in Chapter 3, such system simplification would be the loss of |U| i.e. labiality or |I| i.e. frontness of a vowel towards a simplified vowel.

[24] I thank Horio-san for this data.

predicts that the Owari dialect will eventually become a system C and then a system B dialect in the future.

1.3.4.3 Owari as a unique dialect

While the above typology is illuminating in some respects and leads to further questions on dialects not discussed further here, it does reinforce one fact: Owari is a clear case of rounding coalescence, which is marked. The language has value for Japanese dialectologists as well as theoretical linguists interested in cases of languages with rounding coalescence. It is already relatively well described with materials found in abundance, but analysis is lacking. I analyse the process of Owari and Tokyo coalescence and the contexts where it occurs in more detail in Chapter 3 and 7. I leave an extended investigation of coalescence in other dialects to further research.

1.4 Conclusion of Chapter 1

Above, I have presented a brief overview of Japanese phonological processes and structure, Japanese accent and the typology of coalescence within Japan. I now turn to an examination of diachronic sound changes in Japanese in order to propose a rough time period when coalescence of /Vi/ sequences began. In addition, I examine how vowel sequences came to be, and I discuss possible contact or diachronic origins for expanded vowel systems as seen in Owari.

Chapter 2: Diachrony and coalescence

This chapter examines sound changes and the diachronic developments that have created vowel sequences in Japanese, giving diphthongs in modern Tokyo Japanese and coalesced vowels in Owari Japanese. In the previous chapter, some brief information regarding the phonotactics of Tokyo Japanese were presented as well as basic information on Owari coalescence. Typological arguments were made for Owari Japanese as an interesting case of rounding coalescence. We examine now how vowel sequences occurred as a result of sound change, and I consider the historical record with relation to Owari Japanese in an attempt to date the origins of coalescence.

2.1 The birth of dialect vowels

During the relatively recent history of Japanese, the system of five vowels as found in Tokyo and Kyoto Japanese has expanded in many dialects to six, seven or eight vowels culminating in the largest inventory found in the Owari region and elsewhere. New vowels have been created solely through coalescence.[1] The Owari dialect exhibits the vowels [y:], [ø:] and [æ:] where Standard Japanese has the vowel sequences /ui/ /oi/ and /ai/. Compare the surface vowel system in Owari to that of Tōkyō below in (1).

(1) Vowels in Tōkyō and Owari Japanese

a. Tōkyō vowels

i i:		u u:
e e:		o o:
	a a:	

b. Owari vowels

i i:	y:	u u:
e e:	ø:	o o:
	æ:	
	a a:	

Coalescence began to affect vowel sequences in the Late Middle Japanese period, roughly 1200-1600 C.E., and affected dialects further during the Modern Japanese period (1600 C.E.-Present). The dating in this thesis follows the dates used by Frellesvig (2010).

[1] Tōhoku dialects (e.g. Akita Pref) also exhibit a central vowel [ɨ] only following fricatives. See Hōjō (1982) for discussion.

(2) The periods of the Japanese Language

Old Japanese (OJ) – 700-800 C.E.
Early Middle Japanese (EMJ) – 800-1200 C.E.
Late Middle Japanese (LMJ) – 1200-1600 C.E.
Modern Japanese (ModJ) – 1600 C.E.- Present Day

According to evidence presented later in this chapter, developments in Old and Early Middle Japanese lead to a context for coalescence, while Modern Japanese is the period in which signs of dialect vowels derived from /Vi/ coalescence began to emerge.

2.2 Sound changes in diachrony

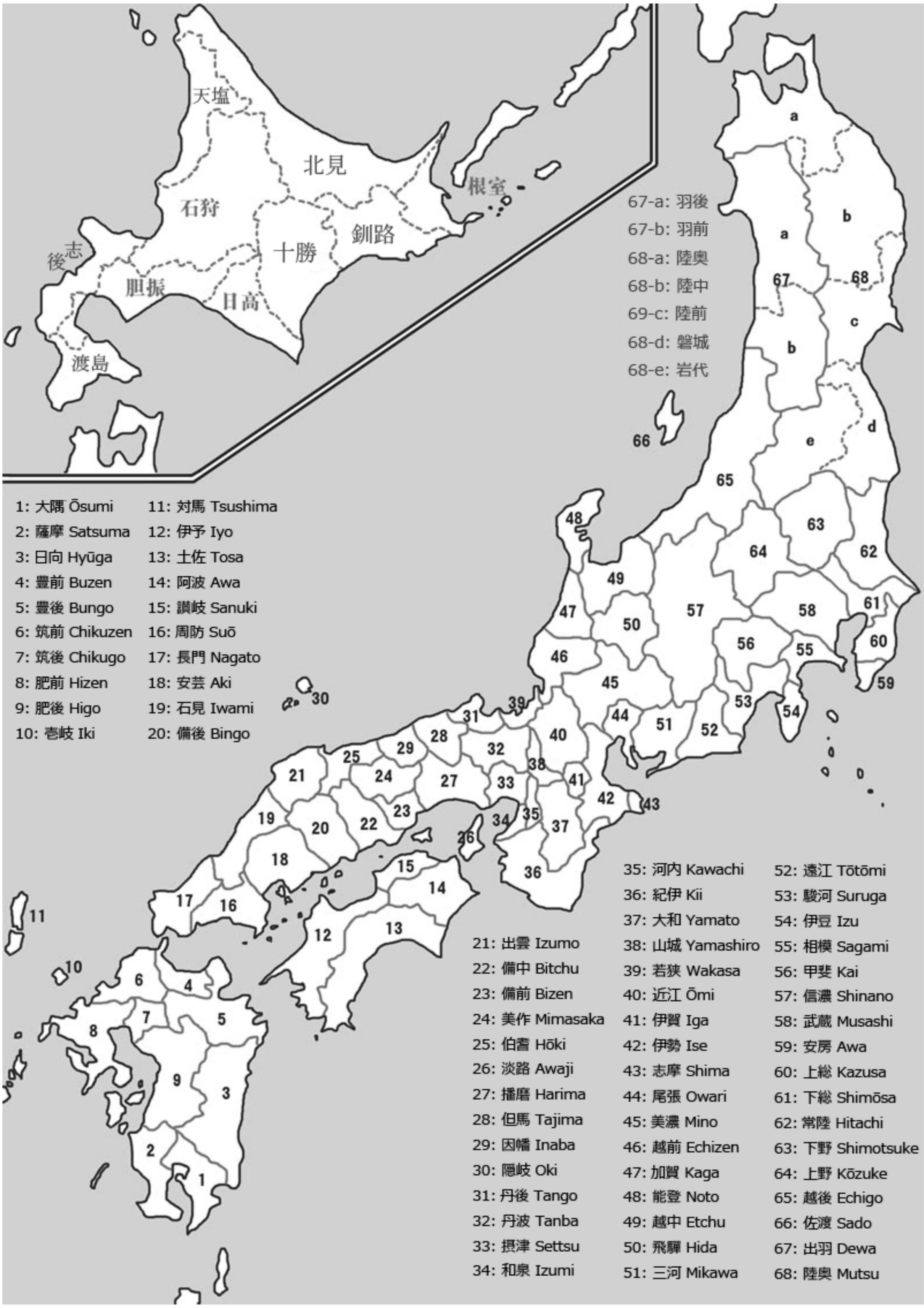
I now consider the impact of diachronic sound change and evidence from texts to propose a date for coalescence of /Vi/ sequences, which has not been explored in the English language literature on Japanese dialectology. I also question a possible Old Japanese (OJ) origin for coalescence. I propose that coalescence occurred in a very different way in OJ to Modern Japanese.

2.2.1 The modern and historic political divisions of Japan

Below, I present a map of the modern prefectures of Japan reproduced from the previous chapter (Figure 5). On the following page is a map of the provinces used prior to the Meiji reformation (Figure 6). The pre-Meiji province names are relevant as they are used often to refer to dialects in the Japanese literature. These names are also used by speakers and residents of these regions themselves (e.g. *Owari-ben* for the dialect of modern Aichi prefecture rather than *Aichi-ben*, *Banshuu-ben* or *Harima*-ben for the dialect of modern Hyōgo Prefecture rather than *Hyōgo-ben*). These province borders may also account for the modern boundaries and isoglosses which still separate dialects. For example, modern Aichi prefecture in Figure 5 consists roughly of the Owari (Fig. 6, #44) and Mikawa (Fig. 6, #51) provinces, each of which has a distinct dialect (Keshikawa 1983, Yamada & Niwa 1989). Modern Tokyo is roughly equivalent to portions of Musashi province (Fig. 6, #58) and Shimōsa province (Fig. 6, #61). I attribute these linguistic boundaries to the travel restrictions placed on commoners during the Late Middle Japanese period (cf. Smith 1968, Sato 1990, Vaporis 1994, Gordon 2003:15). These restrictions of movement can account for the isolated nature of coalescence in some dialects, based on the dating presented later in this chapter.

Figure 5. The current prefectures of Japan

Figure 6: The pre-Meiji Provinces of Japan.[2]



[2] Public domain map drawn from Wikimedia (Wikiwikiyarou 2006).
https://upload.wikimedia.org/wikipedia/commons/7/76/Ancient_Japan_provinces_map_japanese.gif?uselang=en-gb

2.3 Phonological change and Japanese diachrony

This thesis will deal with modern dialects during Part II of this thesis, but it is important to understand how the context for Tokyo diphthongs and Owari coalescence was born. Below we summarise the phonological developments that lead to the existence of modern Japanese CVV syllables, examining the changes in Old Japanese, Early Middle Japanese, and Late Middle Japanese.

2.3.1 The sources for Japanese diachronic phonology

All sources for the understanding of Old Japanese and Middle Japanese phonology depend on orthographic sources, be they in Japanese, Chinese, Korean or Portuguese. Major English language sources include Martin (1987), Frellesvig (2010), Frellesvig & Whitman (2008), Russell (2006), Vovin (2005) among many others. I draw mainly on Frellesvig (2010) for the discussion below. I do not discuss the issue of orthography here as this topic is covered extensively in other works. Further discussion of the relation between text, orthography, and phonology is available in Frellesvig (2010:11-20), Russell (2006) and Miyake (2003) among others.

Old Japanese sources mostly consist of works written in a modified Chinese script with phonographic usage, with much information on Western and Eastern Old Japanese coming from the *Man'yoshū*, a collection of poems from the 8th century C.E. The sources for Late Middle Japanese include not only Japanese sources but also Korean sources in *hangeul* orthography (cf. Cho 1970) and Latin alphabet sources in Portuguese (Rodrigues 1603) and Spanish (Collado 1975). Modern Japanese works are found in Japanese, English and a variety of other languages, though the sources I consider for coalescence are Japanese.

2.3.2 Old Japanese

The Old Japanese (OJ) period is attested early on in stone and metal inscriptions dating to roughly the fifth century (Frellesvig 2010: 21) as well as wooden writing slats (*mokkan*), though the majority of modern knowledge comes from government edicts, documents and poetry dating to the 8th century C.E, such as the *Man'yoshū* poetry collection. Frellesvig gives the rough dates of the OJ period as 700-800 C.E. For our purposes, it is necessary to examine the phonotactics of the language. I claim that an Old Japanese source for modern dialect vowels is not feasible. Here we look briefly at OJ hiatus resolution, which occurred only at compound boundaries and which never involved word internal vowel sequences.

2.3.2.1 OJ Phonotactics and the vowel system

OJ had a strict CV syllable, with no long vowels, vowel sequences or consonant clusters, unlike Modern Japanese. The maximal 'vowel' system attested in texts is a contrast of eight 'vowels' for Western Old Japanese, though the interpretation of the orthographic syllables can be interpreted as either a system of only CV syllables with eight vowels (Miyake 2003) or as contrasting CV and CGV syllables, as in Frellesvig & Whitman (2008). I present the proposed OJ phonemic syllables from Frellesvig (2010) below, which uses the reconstruction proposed by Frellesvig & Whitman (2008).

Table 5: Old Japanese phonemic syllables (Frellesvig 2010:33)[3]

a	ka	ga	sa	za	ta	da	na	pa	ba	ma	ja	ra	wa
i	ki	gi	si	zi	ti	di	ni	pi	bi	mi		ri	wi
	kwi	**gwi**						**pwi**	**bwi**	**mwi**			
u	ku	gu	su	zu	tu	du	nu	pu	bu	mu	ju	ru	
e	ke	ge	se	ze	te	de	ne	pe	be	me	je	re	we
	kje	**gje**						**pje**	**bje**	**mje**			
o	ko	go	so	zo	to	do	no	po	bo	mo	jo	ro	wo
	kwo	**gwo**	**swo**	**zwo**	**two**	**dwo**	**nwo**			**mwo**	**jwo**	**rwo**	

Those syllables in bold above are lost after the Old Japanese period, merging with their counterparts lacking a glide. Notably, words never had vowel sequences internally to which hiatus resolution of any sort applied. Hiatus resolution did apply, however in morphologically complex words.

For Western Old Japanese, Russell (2006:76-83) describes two hiatus resolution processes. These are contraction (or vowel elision in my terms) and monophthongisation, or coalescence in my terms (see also Frellesvig 2010:39-40, Kupchik 2013 on Eastern Old Japanese). Could the described pattern of coalescence in OJ be similar to coalescence in for modern dialects? The answer is no. We will see in the following section that coalescence occurred in OJ in a very different context from the Modern dialects. Furthermore, it cannot be argued concretely that coalescence was regularly active in Old Japanese in the same manner as modern dialects.

2.3.2.2 Old Japanese coalescence

Old Japanese did not have true vowel sequences or heavy diphthongs word internally. The maximal syllable in Japanese was (C)(G)V, if we assume the analysis

[3] I modify this table only slightly from the source in order to use the IPA [j] to represent the palatal glide rather than <y>.

proposed by Frellesvig & Whitman (2008).[4] Vowel sequences occurred only at morpheme boundaries, with coalescence applying only at the boundary between two auxiliary verbs or a noun and a verb.[5] Elision occurs in other contexts, such as the boundary between a noun and a noun or two verb stems. Consider the following examples drawn from Russell (2006), modified with the transcription of Frellesvig & Whitman (2008) and Frellesvig (2010).

(3) Examples of OJ Coalescence (Russell 2006:79), with transcription modified[6]

a. **a*+*i* = *e*
e.g., **naga* 'long' + *iki* 'breath' = *nageki* 'sigh'

b. **i*+*a* = *je*
e.g., **saki* 'bloom' + *ari* 'exist' = *sakjeri* 'is blooming'

c. **o*+*i* = *e*
e.g., **tono* 'palace' + *iri* 'enter' = *toneri* 'attendant'

d. **o*+*i* = *wi*
e.g., **opo* 'big' + *si* 'rock' = *opwisi* 'big rock'

e. **u*+*i*= *wi*
e.g., **waku* 'young' + *iratukwo* '[term of veneration (male)]' = *wakwiratukwo* '[appellation]'

f. **u*+*o* = *wo*
e.g., **situ* 'ancient type of native weaving' + *ori* 'weave' > *sitwori* 'ancient type of native weaving'

g. **u*+*a* = *wo*
e.g., **kaNsu* 'number' + *ape* 'to join' = *kaNswope* 'to count'

Coalescence, as discussed by Russell (2006), is different from coalescence in Owari and Tokyo in a few respects. First, it occurs at the boundary between categories such as a noun phrase and a verb phrase, while coalescence in this context is not evidenced in the Owari and Tokyo dialects. In addition, coalescence was not regular; a specific orthographic sequence did not result in a specific orthographic output: the orthographic sequence *wo* and *i* gave either the output vowel *e* as in *toneri* 'attendant' or *wi* as in

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[4] If the reconstruction proposed by Miyake (2003) is correct, only simple CV syllables were permitted. See also Unger (1977) and Martin (1987).

[5] Russell (2006:119ff) does discuss some cases of consonant loss in pre-Old Japanese proposed by other researchers, but this issue is beyond the scope of the current discussion.

[6] I omit the example <pjeki> '[family name]' which Russell (2006:79) proposes is not a solid example of coalescence.

opwisi ‘big rock. Russell herself notes this is a problem (2006:79), though it is of course possible that this discrepancy is due to the data being drawn from different textual sources. Interestingly, the choice of coalescence or elision was apparently sensitive to the morphosyntactic categories of the adjacent words (Russell 2006:83), which would make Old Japanese hiatus resolution similar to hiatus resolution in other languages such as Shona (Mudzingwa 2010) and many other languages (Casali 1996, 2011:1442). This is not like coalescence in Tokyo or Owari Japanese, where coalescence is more or less exceptionless and does not occur across phrase boundaries. In modern Japanese, coalescence has affected only word-internal vowels within a noun phrase, adjectival phrase and the like. In addition, there is no evidence that the product of coalescence in OJ gave rise to any additional vowels which could correspond to those in Modern dialects. Let us now turn to Middle Japanese in order to examine the origins of vowels sequences.

2.3.3 Middle Japanese creation of vowel sequences

During the Early Japanese period, the phonotactics of Japanese changed to allow CVV syllables and the number of vowel sequences expanded through the following changes:

- The introduction of Sino-Japanese loanwords which retained the source language diphthongs from Chinese without adaptation.
- Regular lenition of /p/ to /w/ and subsequent loss of /w/ and /j/ word-medially
- Irregular lenition patterns, known as *onbin* or euphony.

Each issue will be discussed briefly in turn. Following this, I will discuss the dating for coalescence in Late Middle and Early Japanese.

2.3.3.1 Sino-Japanese diphthongs

Many diphthongs entered the language in the Early Middle Japanese (EMJ) period through importation of Chinese loanwords. Kindaichi K. (1976:158) notes that some Chinese words imported during the OJ or EMJ period had sequences repaired via glide insertion such as *koobai* ‘procurement’, often attested as *kowobai*, but later loans retain their diphthongs. Kindaichi K. proposes that continued contact with Chinese learning, literature and religious ceremonies or readings likely allowed for retention of the Chinese diphthongs. Examples of *au* and *ai* are presented below.[7]

[7] Other sequences such as <Cou> and <Cei> were also introduced during this period (Kindaichi K. 1976:159).

(4) Unaltered Chinese loan words (Roughly Heian period, Kindaichi K. 1976)

ai	'love'	
kai	'level'	
tai	'big'	
sai	'thin'	
au	'centre'	(later [ɔ:] in LMJ, then [o:] in ModJ)
kau	'tall'	(later [kɔ:] in LMJ, then [ko:] in ModJ)
kjau	'capital'	(later [kjɔ:] in LMJ, then [kjo:] in ModJ)

In addition to vowel sequences brought through contact with Chinese, phonotactics were altered independently through a series of lenition processes which gave rise to further heterogenous vowel sequences. These lenition patterns came in regular and irregular types.

2.3.3.2 Regular lenition of /p/

First, I discuss the lenition of the labial obstruent /p/, which was a regular sound change. The lenition of this stop had two pathways. Word initially, /p/ lenited to /f/ in the Late Middle Japanese (LMJ) period, which later lenited further to modern /h/. (Frellesvig 2010:201,311ff). Word medially, /p/ lenited to /w/ preceding the vowels {a, i, e, o} beginning in 950-1000 C.E., while it was lost entirely preceding /u/; The labial glide was never found preceding /u/ (Frellesvig 2010:202).[8] Consider the following examples where the OJ distinction between /p/ and /w/ was lost in certain EMJ words.

(5) Contrast collapse in OJ/EMJ medial p/w (Frellesvig 2010:202)

OJ forms		EMJ forms
a. *apa* 'millet' / *awa* 'foam'	>	*awa*
b. *api* 'meeting'/ *awi* 'indigo'	>	*awi*
c. *kapo* 'face' / *awo* 'blue'	>	*(k)awo*
d. *upe* 'top' / *uwe* 'planting	>	*uwe*
e. *apu* 'meets'	>	*au*

2.3.3.3 Regular Loss of /w/

Also occurring during the EMJ period was the word-medial loss of the labial glide /w/, creating the majority of the vowel sequences present in modern-day Tokyo Japanese.[9] The glide /w/ was first lost preceding /i, e, o/, beginning with the word-medial loss of /w/ preceding the round vowel /o/ around 1000 C.E. It was then lost

[8] Exceptions to lenition processes occurred systematically, as in compounds and mimetic words (cf. Frellesvig 2010:203ff)

[9] Initial /j/ was also lost, but as Frellesvig (2010:208ff) notes, it was produced as an epenthetic glide until the Late Middle/Early Modern Japanese period.

preceding the word-medial front vowels /i/ and /e/ around 1100 C.E. The loss of /w/ is exemplified below.

(6) Data provenanced by 1100 C.E. (Frellesvig 2010:207)[10]

OJ/Early EMJ forms		EMJ forms following glide loss	
a. *mawiru*	>	*mairu*	'come-HUM'
b. *mapi* > *mawi*	>	*mai*	'dance'
c. *opwi* > *opi* > *owi*	>	*oi*	'grow.INF'
d. *uwe*	>	*ue*	'plant.INF'
e. *upe* > *uwe*	>	*ue*	'top/up'
f. *mapje* > *mape* > *mawe*	>	*mae*	'front'

Note that the forms in the right-hand column are still the same in modern Standard Japanese. The glide /w/ was later lost word-initially preceding /i, e/ by 1300 C.E., as in OJ *winaka* 'countryside' to EMJ/ModJ *inaka* and OJ *wemi* 'smile' to EMJ/ModJ emi (Frellesvig 2010:207).[11]

2.3.3.4 Irregular sound change, or *onbin*

I now turn to the issue of the irregular sound changes, also known as *onbin* or euphonic sound changes. *Onbin* changes consist of the loss or change of a word-medial CV syllable. These changes began as early as the end of the OJ period roughly around the end of the 8th century and continuing until the 10th century (Frellesvig 2010:191) Unlike the set of regular changes already discussed, *onbin* changes were not regular in the sense that they did not affect *all* instances of a consonant in a certain position (e.g. all instances of medial /k/), though the affected syllable was always /Ci/ or /Cu/. Certain outcomes are relatively predictable (e.g. /k/ being elided), but not all consonants gave a consistent result. *Onbin* changes gave rise to either a word-medial geminate, a nasal-consonant cluster or a vowel sequence through consonant elision. Frellesvig (2010) has noted that this permanently altered the syllable structure of Japanese and created heavy syllables. I do not provide a full overview of *onbin*, but see Frellesvig (1995, 2010) for further discussion.

Consider first the modern realisation of non-past and gerund forms for consonant-final verb stems below which terminate in /k/ and /g/, with comparative vowel-final stems.

[10] I transcribe this data as well as other presented data without angled or squared brackets as all pre-modern data is drawn from orthographic evidence. I present data in an IPA transcription modified from the source where necessary.
[11] As with initial /j/ preceding /e/, /w/ was retained until Modern Japanese as an epenthetic consonant preceding /o/ (Frellesvig (2010:208ff).

(7) Non-Past and Gerund verb forms in Tokyo Japanese

Stem	Non-Past	Gerund	Gloss
	/Stem-(r)u/	/Stem-te/	
a. /tabe-/	[taberu]	[tabete]	‘eat’
/oki-/	[okiru]	[okite]	‘wake up, intr.’
/koge-/	[kogeru]	[kogete]	‘char, trans.’
b. /aruk-/	[aruku]	[aruite]	‘walk’
/hirak-/	[hiraku]	[hiraite]	‘open, intr.
/isog-/	[isogu]	[isoide]	‘hurry’
/kog-/	[kogu]	[koide]	‘row’

Vowel-final stems are realised with no phonological alteration in the non-past and gerund forms. Upon examination of the /g/ and /k/ consonant-final stems in (7)b above, it is clear that the final consonant is elided in the gerund form e.g. [aruite] ‘walk-GER’ *[arukite] *[arukte]. In fact, all /k/ or /g/-final verbal stems in Modern Japanese exhibit an alternation where the final consonant is lost in the gerund form, as well as certain other forms such as the past (e.g. [aruita] ‘walk-PAST’).[12]

The elision of these consonants is not synchronic; it is an effect of the diachronic *onbin* sound changes.[13] The loss of stem-final consonants began in Early Middle Japanese (Frellesvig 2010:191ff).[14] I focus here on the loss of consonants in verbs and adjectives which led to vowel sequences. Consonant-final verb stems ending in /k/ or /g/ and sometimes /s/ exhibited loss of the stem-final consonant when certain suffixes followed in the EMJ period, such as past /-ta/ and gerund /-te/. This loss gives rise to vowel sequences in the gerund and past tense forms e.g. /kak-u/ [kaku] ‘to write-NP, /kak-te/ [kaite] ‘write-GER’. In OJ, note that all consonant-final stems retained their

[12] The /i/ in the modern forms is possibly retained from the Middle Japanese period following loss of /k/, though Davis & Tsujimura (1991) analyse it as an epenthetic vowel.

[13] It has been proposed in the literature that onbin processes can be analysed synchronically (Davis & Tsujimura 1991), and this assumption is made in a large portion of the literature on generative Japanese phonology (e.g. Yoshida S. 1996, Nasukawa 2000). Following the analysis of Davis & Tsujimura, the realisation of the Gerund form [kaide] ‘smell-GER’ is derived from underlying /kag-te/ through the ordering of voice assimilation (/kag-te/ to /kag-de/ ‘smell-GER’), epenthesis (giving /kagide/ ‘smell-GER’) and velar elision (giving [kaide] ‘smell-GER’). I do not believe that a synchronic analysis of *onbin* is tenable, based on the experimental work which shows that *onbin* is not productive in novel verb conjugation tasks (de Chene 1983; Vance 1987,1991; Batchelder & Ōta 2000, Klafehn 2003, Sugaya 2011) and neurolinguistic EEG research that suggests that verb production co-occurs with events related to lexical access (Kobayashi, Sugioka and Itō 2012).

[14] These changes occurred preceding the high vowels /i/ and /u/, but as discussed, results were variable and application of sound change was somewhat unpredictable. *Onbin* changes seem to have affected some categories relatively regularly (e.g. verb stems) while changes in nouns and compounds were irregular; both unchanged and altered *onbin* forms of some words co-existed for some time according to Frellesvig (2010:192).

stem-final consonant, e.g. *kakite* 'write-GER' (Frellesvig 2010:110), Modern [kaite]. The voicing of the gerund /-te/ to [de], as seen in the modern [kogu]~[koide] 'row-NP, row-GER' alternation above, can be accounted for either by assuming that there was once a consonant cluster /gt/ with concomitant voicing assimilation, or by considering proposed transformation of a medial voiced consonant-vowel syllable to a nasal vowel, e.g. /gV/ > [Ṽ]. According to Frellesvig, the elision of a stem-final voiced consonant gave rise to a nasal vowel, where OJ *kogite* 'row-GER' became EMJ *koĩde* (Frellesvig 2010:193).[15] This nasal vowel voiced the suffix-initial consonant, with the proposed EMJ *onbin* affected stem of /kog-/ 'row' being /koĩ-/ (Frellesvig 2010:,197, 231). No trace of this proposed nasal vowel remains in modern Japanese verbs, though certain Tohoku dialects have pre-nasalised voiced consonants (Nasukawa 2000).[16]

The elision of medial-consonants had the effect of creating vowel sequences, and so this set of changes are known as vocalic *onbin*. Note that vocalic *onbin* outputs are also attested for other consonants, namely /p/, /b/, /m/, /s/ and /w/, but see Frellesvig (1995, 2010) for more. Other *onbin* changes which created a consonant cluster also exist, known as consonantal *onbin*. Consonant-final stems ending in /t/, /w/ or /r/ gave rise to a geminate consonant in the past or gerund, e.g. /kaer-u/ [kaeru] 'go home-NP', /kaer-ta/ [kaet:a] 'go home-PAST'. Verbal stems ending in /m/ or /b/ give rise to NC clusters in Tokyo Japanese e.g. /asob-u/ [asobu] 'play-NP', /asob-ta/ [asonda] 'play-PAST'. Diachronically, some verbs have evidenced both a consonantal and a vocalic *onbin* pattern, with some modern dialects retaining the consonantal pattern and others the vocalic pattern.

Some dialects show a tendency to retain vocalic *onbin* forms rather than consonantal forms of other consonant-final stems. One example is the realisation of /moraw-ta/ 'receive-PAST', realised in Tokyo as [morat:a] with a geminate, but in Osaka as [moro:ta] with a long vowel. Another example of this is the modern realisation of /yom-/ 'read' in the past tense, which is [yonda] in Tokyo Japanese and [yo:da] in some Kyūshū dialects (Uwano et al 1989, Map 24). The form [daita] 'put away-PAST' derived from /das-ta/ is found in many central and western Japanese dialects, as noted in Uwano et al (1989, Map 23), rather than standard [daɕita]. In the Owari dialect, s-final stems exhibit a vocalic *onbin* variant which has undergone coalescence. This is

[15] This occurred after possible intermediate stages, with Frellesvig proposing an intermediate state with prenasalisation of a voiced consonant and fricativisation preceding complete elision, i.e. OJ /gi/ > [$^{n}g^{j}i$~$^{n}ɣ^{j}i$] > [$^{n}ɣ^{j}$:] > EMJ [ĩ] (2010:197)
[16] However, see Chapter 8 for a proposal regarding the existence of nasal vowels in modern Japanese.

exemplified in the past form of [dasu] 'put out-NP', which is [dæ:ta] 'put out-PAST' from /dai-ta/.

As vocalic onbin affected certain verbal stems, adjectival suffixes also exhibit the elision of velar consonants. Most importantly for coalescence, the OJ adjective adnominal suffix *–ki* underwent elision, giving EMJ *-i* (Frellesvig 2010:233), which is now the adjectival non-past ending /-i/, e.g. OJ adnominal *takaki*, modern [takai] 'tall-NP' (Frellesvig 2010:233). As all adjectival stems end in a vowel, this change gave rise to vowel sequences in a regular way.

2.3.3.5 Summarising *onbin*

In summary, the *onbin* changes that gave rise to vowel sequences relevant to this study were vocalic *onbin*, affecting stem-final /k/, /g/, and /s/.[17] Examples of consonant loss word-medially produced by *onbin* are shown below.

(8) Some examples of vocalic *onbin* from OJ to EMJ/LMJ

a. Adjectival adnominal forms (Frellesvig 2010:233,340)

	OJ form	EMJ/LMJ/Modern form	
i.	*takaki*	> *takai*	'tall, finite adnominal'
ii.	*utsukushiki*	> *utsukushii*	'beautiful, finite adnominal'
iii.	*yoki*	> *yoi*	'good, finite adnominal'

b. Verbs and Adverbs (Frellesvig 2010:193)

	OJ Form	EMJ vocalic form	
i.	*omopite*	> *omoute*	'think-GER'
ii.	*okite*	> *oite*	'to put-GER'
iii.	*takume*	> *taume*	'wholly'
iv.	*idasite*	> *idaite*	'take-out-GER'
v.	*mawide*	> *maude*	'visit-HUM'

2.3.3.6 Further vowel sequence alteration

It should be noted that vowel raising occurred sporadically following the creation of vowel sequences, affecting unaccented mid vowels in sequences which were raised to high vowels. This is found in the word *kaeru* 'frog', with /e/ in /ae/ raising to /ai/, giving LMJ *kairu* (Bjarke Frellesvig, P.C.). This process is further supported as /ae/ sequences in Tokyo Japanese sometimes correspond to /ai/ sequences which have undergone coalescence in the modern Owari dialect, e.g. Tokyo [hae] 'fly', Owari [hæ]

[17] If the lost onset was /p/ or /w/, the vowel remaining was /u/. Under an Element Theory analysis, this is viewed as the reassociation of the [U] element from the labial consonant to the following nucleus.

through intermediate **hai* < *hae*. See Chapter 3 as well as Youngberg (2013, 2015) for more discussion of coalescence affecting historical *ae* sequences in Owari. Let us now consider the historical dating of coalescence

2.3.4 Late Middle Japanese and the birth of coalescence

It is necessary to clearly delineate the historical period in which coalescence began – it is clear that an Old Japanese origin of /Vi/ coalescence is unlikely, yet the context for coalescence following lenition and elision of consonants in the Middle Japanese period was met as early as 1100 C.E. Coalescence first affected /Vu/ sequences at some point between 1100 C.E. and 1603 C.E. Martin (1987:44) suggests 1300 C.E. as the starting date for coalescence of /Vu/, based on textual evidence and variant spellings of words in Japanese. The end date for coalescence of this period must have preceded 1600 C.E., as this is the time when the Portuguese missionary João Rodrigues published the famous grammars *Vocabvlario da Lingoa de Iapam* (1603) and *Arte da Linguoa De Iapam* (1604), two early grammars of the Japanese language. These texts are important due to their use of a latin orthography which gives a relatively more transparent transcription of Japanese phonology compared to the native *kana* syllabary. It also gives the phonologist a clear picture of what processes affected Japanese during the LMJ period. Relevant to our discussion, coalescence eradicated all /Vu/ sequences, which are attested in Rodrigues (1603) as monophthongs. /Vi/ sequences were not affected at this time, as many diphthongs are attested in the same work. In this wave of coalescence, the vowel [ɔ:] was borne from /au/ sequences, [jo:] from the sequence /eu/, [o:] from /ou/, and [ju:] from the sequence /iu/.

(9) Coalescence of /Vu/ (Frellesvig 2010:319-325,414;)[18]

EMJ forms	LMJ forms	Rodrigues (1603)	Gloss
keu	> /kʲo:/	<*qeô, qiô*>	‘today’
eu	> /jo:/	<*yô*>	‘get drunk’
uresiu	> /uresju:/	<*urexŭ*>	‘long ago’
iu	> /ju:/	<*yŭ*>	‘say’
tauto-	> /tɔ:to-/	<*tŏto-*>	‘precious’
auti	> /ɔ:ti/	<*vŏchi*>	‘Japanese bead tree’
ougo	> /o:go/	<*vôgo*>	‘protection’
osou	> /oso:/	<*vosô*>	‘slowly’

The vowel [ɔ:] derived from /au/ was later lost and merged with [o:], which occurred in the majority of modern dialects. The resulting /Vu/ coalescence contrast between [ɔ:]

[18] Note that glide insertion occurred automatically word-initially in LMJ, with /e/ realised as [je] and /o/ realised as [wo], as in *vosô* [woso] ‘slowly’.

and [o:] still exists in parts of Niigata Prefecture and Nagano Prefecture (Kenmotsu 1983, Uwano et al 1989, Ohashi 2002) with some reflex of this contrast as [a:] versus [o:] retained in Izumo (Martin 1987, Uwano et al 1989:17).

2.3.5 Coalescence of /ai/ in Late Middle Japanese?

It is unclear when the coalescence of /Vi/ sequences began, but there is no evidence of coalescence affecting these sequences in the texts of Rodrigues (1603/1980, 1604) or the later Spanish missionary scholar Collado (1632/1975) which I examined. Rodrigues does explicitly mention the dialects of Owari and Nagasaki (Keshikawa 1971:12), so it is clear that the language spoken by some in the Owari area and Nagasaki had developed differently to the variety of Japanese spoken by officials, though no mention of various pronunciations is made with regards to the Owari region.

If /Vi/ coalescence had begun at this point to affect /ai/, it is likely that Rodrigues would have been able to distinguish the difference between [e] and [ɛ] or [æ]. European Portuguese has a contrast between the vowels [o] and [ɔ] as well as [e] and [ɛ] (Cruz-Ferreira 1995) which is a contrast also found in Old Portuguese (de Haas 1988:174). These vowels are also encoded in the modern orthography as <ô>/<ó> and <ê>/<é> respectively in Modern Portuguese, while Old Portuguese in Rodrigues (1603) transcribed Late Middle Japanese [o] as <ô> and [ɔ] as <ŏ>. Relevant examples are <qiô> for [kjo:] 'today' and <tŏto> for [tɔ:to] 'precious' (Frellesvig 2010:319). There is no evidence of contrast between a vowel such as <ê> and <ĕ> for [e:] contrasting with [æ:] or [ɛ:]. If coalescence did not give rise to a new vowel and gave [e:], or if another hiatus resolution process took place, this would have been obvious from the alteration of forms containing /ai/ in Rodrigues (1603). There is no evidence in support of the widespread alteration of /ai/.[19] At the very least, if coalescence had begun to affect /ai/ and given rise to [e:], it would have been notated. There is no evidence of this, and diphthongs are retained in the data from Rodrigues (1603). It is of course possible that /ai/ had coalesced at this point to [ɛ] and that Rodrigues simply did not encounter speakers who had a dialect with this change. Further research on LMJ documents will need to be undertaken at a future date. Let us now consider later sources in the Early Modern Japanese period, which do show evidence of possible coalescence.

[19] Keshikawa (1971:92) does note that in a discussion of the Chūgoku region of Japan, Rodrigues (1603) notices the change of /ai/ to [a:], as in *narumai* to *narumá* or [narumai] to [naruma:]. This change is not coalescence but perhaps total assimilation or deletion of /i/ and compensatory lengthening of [a]. This change is found in the modern recordings of Yamaguchi Prefecture (Kindaichi & Shibata 1966-1972). This shows that at least in some dialects, /ai/ sequences were not exempt from phonological change, though it is not possible to say that *coalescence* of /Vi/ was active at this period.

2.3.6 Coalescence in Modern Japanese

For the Owari dialect, there is evidence that coalescence of /Vi/ sequences may have occurred before the 1800's in the late Edo period. Keshikawa (1971:87-97) and Hikosaka (1997:125) both present evidence drawn from popular works, of the Edo period as well as travel books and letters[20]. Keshikawa (1971) first proposed that the odd transcription for certain /Vi/ sequences found within popular works are perhaps purposeful manipulations of the *hiragana* syllabary, representing the coalesced counterparts of /ai/ and /oi/, [æ:] and [ø:], instead of sequences such as [ai] or [oi]. The kana syllabary offers no easy method for the transcription of a dialect with more than five vowels. While Keshikawa (1971:87) says that the target diphthongs which are written as <kai>, <tai> in the examined texts offer no evidence for or against coalescence having occurred at this point in time, he does note that alterations where <ai> is expected could possibly represent [æ:]. Similar evidence is also presented for <oi>.[21] Consider a sample of the expected forms and attested orthographic forms below. The attested spellings are not expected even when considering possible etymological forms. I provide a modern Owari dialect transcription, dating, and gloss.

Table 6: Orthographic evidence from Keshikawa (1971: 87-95;91)

Expected form	Attested form	Modern	Date of text	Gloss
a. <osogai>	<osogiya>	[osogæ:]	1800 C.E. / Kansei 12 in *Onnarakan*	'frightening-NP'
b. <omai/omahe/ omawe>	<omaja>	[omæ:]	1804 C.E. / Bunka 1 in *Nagoya Kenbutsu Shihen no Tojitasi*	'2nd person pronoun'
c. <hairu>	<haheru>	[hæ:ru]	1816 C.E. / Bunka 13 in *Kokkeigionmamori*	'enter-NP'
d. <omoshiroi>	<omoshirohe>	[omoshirø:]	1809 C.E. / Bunka 6 in *Ashikujiki*	'interesting-NP'

The above examples are found when describing speech, as in <omaja> 'you' which describes the speech of a farmer. Keshikawa supposes that <Omaja> is perhaps a transcription of [omæ:] as it is differentiated from other orthographic instances of

[20] Most of the works analysed by the authors are *sharebon*, or late-Edo period novelettes. These texts were written by native Owari authors, while others are books by outsiders traveling within the Owari area.

[21] All misspellings of <ui> are represented as <ii>, so Keshikawa (1971) concludes that while there is the possibility that this represents [y:], it could also represent [i:].

<omae> or <omahe> in the source text, which are not describing the speech from this character (Keshikawa 1971:87). Other texts exhibit manipulation of orthography in different ways, as shown above with <hairu> being written as <haheru>, perhaps to represent [hæ:ru] 'enter-NP', derived from LMJ <hairu>. Hikosaka (1997) provides further examples drawn from this period, while more recent work from this author (Hikosaka 2014:27) discusses the realisation of the Tokyo copula [da] as [dæ:] in the work *Nagoya Kenbutsu* (1804 C.E.). Crucially, Hikosaka (2014) also points out that the realisation of the copula as [dæ:] in the Owari area was noted at the time of an early language survey from the *Kokugo Chousa Iinkai* or National Language Survey Committee in 1906 C.E. If we do take this textual evidence seriously, this means that coalescence has taken place in the Owari region at some point preceding 1800 C.E.

With regards to other regions, Keshikawa (1971) discusses one piece of earlier evidence from outside of the Owari region which might show the existence of [æ] in the LMJ period. In the letters of the Buddhist priest Takuan, Keshikawa points out a passage in a letter from roughly 1630 C.E. that discusses a syllable in the pronunciation of people which is not *dai* and which is not *deja,* but somewhere in between. This passage refers to travels through Yamada in Ise (modern Mie Pref.), Tajima (modern Hyōgo Pref.) and Tango (modern Kyōto Pref.). Keshikawa surmises that the vowel described by Takuan could possibly be [æ]. I point out that the modern dialects of northern Hyōgo and Kyōto exhibit the vowels [æ] and [ø] as a result of coalescence (cf. Linguistic Atlas of Japan 1966-1974 Maps 20, 24 as well as Uwano et al 1989).[22]

If we disregard textual evidence, let us consider the dating of early recordings. The coalescence of /Vi/ sequences is present in the dialect recordings presented in Kindaichi & Shibata (1966-1972). The recordings were made in the 1950's, and some of the speakers in these texts are listed as having been born at the end of the 1800s. For those speakers who exhibit coalescence of /Vi/, I assume that these speakers would have learned the dialect patterns from the preceding generation of speakers, giving coalescence of /Vi/ a pre-1900 C.E. origin at the very latest. In sum, I propose that /Vi/ coalescence began as late as 1800 C.E. if we take textual evidence seriously, though further evidence may be found which clarifies the vowels discussed in earlier documents which would give coalescence a pre-1600 C.E. origin. Confirmation of this would put /Vi/ coalescence in the LMJ period along with /Vu/ coalescence.

[22] If the letters from Takuan are describing [æ], this means that coalescence applied to /Vi/ sequences prior to 1630 C.E. and would perhaps mean that coalescence affected both /Vi/ and /Vu/ sequences during the Late Middle Japanese period, with Rodrigues (1603, 1604) encountering only speakers which did not speak one of these dialects. Deeper examination of diachronic dialect evidence is beyond the scope of this current thesis; I hope to cover this issue in future research.

2.3.7 Did Owari gain its vowels from contact?

A phonologist assuming a language internal source for a phonological change must confirm that there is no influence from language contact. Based on the dating discussion above, coalescence could have arisen at any point between 1600 C.E. and 1800 C.E., meaning that this occurred when Japan was in contact with other nations. As Japan had contact with Dutch, Portuguese, Korean and Chinese officials and traders, one wonders if the Owari dialect gained its fronted vowels via contact with languages which had the vowels [æ/ɛ], [y] and [ø], namely Dutch (Booij 1999) or Korean (Lee & Ramsey 2011). The possibility of contact influence on any Japanese dialect is unlikely for two reasons.

The first reason why contact is unlikely as a source for phonological change is that there was a lack of sustained contact between the Dutch and Korean visitors and those living in mainland Japan during the early Edo period (Kazui & Videen 1982). The Dutch were confined largely to Dejima in Nagasaki, Western Kyūshū. A restricted travel policy for foreigners was enacted in 1639 C.E., following a change in attitudes towards foreigners by Tokugawa Iemitsu, the *shogun* or leader of Japan at the time (see Sato 1990, Vaporis 1994). According to Kazui & Videen (1982), Korean relations at this time remained intact, though I have found no evidence of sustained settlement or travel of populations between the two nations beyond diplomatic or official travel.

Even if one finds evidence of sustained Korean settlement during this time period, contact would not have brought the vowels [æ], [ø] and [y] to Japanese shores. This is because Korean did not have the relevant vowels until roughly the same time as Japanese dialects. While modern Korean has until recently displayed the vowels [ø] and [y], Lee and Ramsey (2011:264) propose that Korean did not have the vowels [y] or [ø] before 1600 C.E. [23]

2.4 Conclusion of Chapter 2

I have presented a summary of historical developments within Japanese phonology which gave rise to vowel sequences. Lenition and loss of consonants in Old and Early Middle Japanese created the first vowel sequences, along with the importation of Chinese loanwords. In the Late Middle Japanese period, coalescence had affected all sequences terminating in /u/, while sequences terminating in /i/ were unaffected (as attested in Rodrigues 1603). This state of affairs is reflected in modern Kansai and Tokyo Japanese, with Tokyo Japanese retaining /Vi/ sequences. I then discussed

[23] See also Cho (1970) for discussion of Japanese vowels transcribed in Korean-language grammars of Japanese.

possible evidence for the dating of coalescence affecting sequences terminating in /i/, with textual evidence showing a pre-1800 C.E. origin for this coalescence process in the Owari region. Other evidence may be available for other dialects, which will refine this date in future research. I concluded with a discussion of possible language contact, and concluded that coalescence is a Japanese-internal process without interference from Dutch or Korean.

Let us now turn to synchrony and consider the modern structure of vowels and consonants before examining the prosodic structure of Japanese syllables.

Chapter 3: Element Theory

In this chapter, I discuss the representation of Japanese segments within the framework of Element Theory (Kaye, Lowenstamm & Vergnaud 1985, Charette & Göksel 1994, Harris & Lindsey 1995, Backley 2011). Recent review of various strands of Element Theory (ET) is found in Backley (2012). This theory proposes that segments are composed of unary primes known as elements, also found in Dependency Phonology (Anderson and Jones 1974, Anderson & Ewen 1987) and Particle Phonology (Schane 1984). Unary feature approaches may also be found in works such as Clements & Hume (1995) and Hall (2007). See also van der Hulst (2016) for an overview of ET and other unary or monovalent feature approaches. Below, I introduce the basics of ET with specific reference to vowels, basing my analysis of the Japanese vowel system on Revised Element Theory (Charette & Göksel 1994, 1996).

The representation of the low vowel [a] in in ET would be solely the element |A|. This lies in contrast to the composition of this segment in Feature Theory (Chomsky & Halle 1968), which is [+low, -high, +back, - round]. Unlike more recent versions of feature theory such as Feature Geometry (Clements & Hume 1995), there are no features and no binary values in ET.[1] Segments in Element theory are composed of the six elements |A|, |I|, |U|, |L|, |H| and |ʔ|

I introduce the basics of the theory in 3.1. In section 3.2, I present further discussion of vocalic representation, as well as an analysis of Tokyo and Owari Japanese vowel inventories and processes. I discuss the representation of Japanese consonants in section 3.3, including the various assimilation processes which consonants undergo.

3.1 The basics of Element Theory

In Element Theory (ET), all segments are composed of one or more elements from a set of six, which are used for segmental representations in both vowels and consonants. These elements are |A|, |I|, and |U| for resonance (or place), and |L|, |H| and |ʔ| for manner. I assume this set of elements following Revised ET, discussed in Charette & Göksel (1994, 1996), Cobb (1997), Ploch (1999) and Kaye (2001). The same set of elements is also assumed in more recent works on ET, such as Backley (2011). For the purposes of this chapter, I assume a nucleus and an onset; I expand on representation in Chapters 5 to 8.

[1] This does come at the cost of removing the class of high vowels, for example.

When associated to a nuclear position, the elements are interpreted as vowels. The element |A| is realised as an open vowel such as [a], |I| is realised as a front vowel such as [i] and |U| is realised as a vowel produced with lip compression or lip rounding, such as [u]. Elements may also be combined and create complex expressions, with the resulting expression retaining the broad qualities of each element. A vocalic expression composed of the open element |A| and the palatal element |I| would be |AI|, interpreted phonetically as [e], [ɛ] or [æ]. See the set of elements and their combinations below.

(1) Three elements for vowels, seven possible expressions

|A|	[a]
|I|	[i]
|U|	[u]
|AI|	[e]
|AU|	[o]
|IU|	[y]
|AIU|	[ø]

An expression is any combination of elements, with a simplex expression consisting of one element and a complex expression consisting of two or more elements. The manner elements in vocalic expressions produce secondary effects, with |L| producing nasality (Ploch 1999), |H| giving breathy voice and |ʔ| giving creaky voice (Botma 2004). To the above expressions we can also add a head position to differentiate between different complex expressions. A head is given more prominence in the expression as compared to the other elements, known as operators (Backley 2011). Consider a possible contrast between expressions combining |I| and |U|, giving |UI| and |IU| where the head element is underlined and to the right. These expressions would be the ET representation of the vowels [y] and [ʉ] in Norwegian and Swedish, which have contrasting high front round vowels (Charette & Göksel 1996, Backley 2011). I discuss the concept of heads in more detail below.

The consonantal interpretation of an element is found when associated to a position such as an onset. When associated to an onset, the element |A| typically correlates to alveolar consonants, |I| to palatal consonants and |U| to labial consonants, with velar place being unmarked.[2] The other elements produce manner effects, with |L| or the low tone element for voicing and nasality (Ploch 1999, Nasukawa 2000, Botma

[2] These categories are assumed as true in Revised Element Theory, Other relations between elements and their correlating consonant manner or place may be proposed; |A| correlates to pharyngeal consonants (Bellem 2007) while |U| may also correlate to velars (Scheer 1996, Backley 2011). The representation of coronality is debated elsewhere; see Pöchtrager (2006) for a proposal of coronality represented as structure and Cyran (1997, 2008) and Backley (2011) for further arguments in favour of correlating coronals and |I|. See below for discussions of consonant representation in Japanese.

2004), |H| or the high tone element for frication and aspiration (Cyran 1997, 2010; Botma 2004) and |ʔ| or the glottal element for glottal closure (KLV 1985, Harris & Lindsey 1995).

Previous research on the ET representation of Japanese has been presented by Yoshida S. (1996) and Yoshida Y. (1999).[3] In these works, an earlier iteration of ET is used, found in KLV (1985), Harris (1990) and Harris & Kaye (1990). The original proposal for ET contained eleven elements as well as a categorisation of elements called charm, used to restrict the combination of elements.

One relevant difference between earlier ET work and Revised ET used in this thesis is the previous use of the separate element |L| to represent voicing and the element |N| for nasality, which is found in the work of Yoshida S. and Yoshida Y. More recent work on ET such as Ploch (1999), Nasukawa (2000) and Botma (2004) assumes that the work of |L| and |N| is subsumed into one element |L|, correlating to both nasality *and* voicing. The interpretation of merged |L| depends on its role as head or operator within an expression. I discuss the distinction between head and operator below.

Revised ET also discards the notion of charm, which was a theoretical device meant to restrict the combination of elements. However, charm made the wrong predictions regarding the unmarkedness of -ATR mid vowels (Coleman 1990, Kaye 1990c). It also could not generate the low nasal vowel [ã], though this is one of the most common nasal vowels (Ploch 1995, 1999). To further restrict the generation of expressions, the elements were reduced to six in number and charm was discarded, with Licensing Constraints (Charette & Göksel 1994) proposed to restrict the generation of elemental expressions.

Let us now consider the arguments in favour of ET. I focus below on vocalic representations and evidence. The discussion of consonants is presented in abundance elsewhere in Harris & Lindsey (1995), Botma (2004) and Backley (2011), though I provide revised consonant representation in 3.3. We begin with an examination of the three main elements for vowels. |A| |I| and |U| represent the broad categories of lowness, frontness and roundedness respectively. The elements only appear once within an expression, ruling out an expression such as *|AA|. Elements may also combine, discussed in 3.1.3.

[3] Discussion of the representation of [r] is also found in Nasukawa & Backley (2011) and Japanese nasal consonant interactions in Nasukawa (2006).

3.1.1 Arguments in favour of the elements

Firstly one of the motivations for |A|, |I| and |U| is their correlation to the unmarked vowels [a], [i], [u]. Previously, Maddieson (1984) has claimed that the vowels [a], [i] and [u] are the most common vowels in the world's languages. ET further claims that these vowels are interpretations of the universal elements |A|, |I|, |U|. The claim of universality may seem unclear when one considers certain languages which do not have the exact vowels {a, i, u}, but consider three vowel systems such as pre-contact Quechua with the vowels [ɐ] [ɪ] [ʊ], as compared to a language such as Moroccan Arabic containing [a] [i] [u] (Backley 2011:19). If we assume that |A|, |I| and |U| are phonological objects which are interpreted as the broad categories open, front and round with no universal phonetic specification, rather than having one single phonetic correlate, one can easily agree that though the vowel systems of Quechua and Arabic are phonetically different but have the same phonological specification.

3.1.2 |A|, |I|, |U| and acoustic phonetics

Backley (2011) has argued that the vowel primes of ET align with the acoustic arguments for the unmarked nature of /a, i, u/. Quantal Theory (Stevens 1989) and Dispersion Theory (Lindblom 1990) are acoustic phonetic models which predict that /a/, /i/ and /u/ will be the basic three vowels based on their phonetic characteristics. Quantal Theory (Stevens 1989) supposes that the three vowels *a*, *i* and *u* all have the most stable acoustic qualities and are the most clear to the hearer. Dispersion Theory (Lindblom 1990) proposes that the universal existence of *a*, *i* and *u* is a characteristic of these vowels 'filling out' the maximum acoustic parameters in the vowel space. Backley (2011) argues that ET representations are a better fit to these phonetic theories than features based on articulation, as in binary feature theory (FT) (Chomsky & Halle 1968). Backley also points out that ET allows for a certain amount of variation and signal distortion for both listener and speaker, meaning that the open vowel does not have to be [a], but something within this acoustic range.

In a proposal regarding the cognitive and acoustic reality of the elements, Harris & Lindsey (1995:53) argue that the elements |A| |I| and |U| are 'shorthand notations' for rough acoustic patterns. According to Harris & Lindsey, the elements are broad acoustic shapes cut from the speech stream, not articulatory instructions as in FT features such as [±low]. What is crucial to understand here is that there is no universal one-to-one mapping between an element and a specific phonetic interpretation. For Harris & Lindsey (1995), the elements are defined as broad acoustic shapes akin to colours, which are fine-tuned by the speakers and hearers of each language. |A|, |I| and |U| are realised as some vowel which exhibits certain signatures, correlating to a low or open vowel, a front vowel and a rounded vowel which achieves a certain spectral shape. Under this view of element theory, it is purely possible that languages which do not have [a], [i] or [u] simply have a different phonetic realisation of the universal elements |A|, |I| and |U|, such as [a], [e] and [o] if |I| and |U| are interpreted phonetically as mid vowels. For further discussion of the analysis of elements as instructions for acoustic modulation and the implementation of such a proposal, see Harris & Lindsey (1990, 2000), Harris (1994, 2003, 2004), Kula (2005), and Backley (2011). I now turn to vocalic processes which can be captured elegantly by using the elements.

3.1.3 For elements in vowels: diphthongisation, coalescence and reduction

In ET, elements may be realised as simplex expressions or as complex combinations. To create further contrast, |A| combines with |I| to form |AI| or the mid vowel [e], with qualities of openness and frontness. Likewise |A| combines with |U| to form the open and round vowel |AU| or [o], while |I| and |U| combine to form the front and round vowel |IU| or [y]. For Tokyo Japanese, the expression |A| is interpreted as [a], |I| is interpreted as [i] and |U| is interpreted as the back vowel produced with lip compression [ɯ^{β}] or [u]. The Tokyo Japanese complex expressions are |AI| for [e] and |AU| for [o].

Support from the composition of vowels such as [e] and [o] as being composed of the basic elements |A| |I| and |U| comes from processes like coalescence, vowel reduction and diphthongisation. Monophthongs often become diphthongs, while two adjacent vowels may coalesce to create one single vocalic expression. In the terminology of Schane (1984) and Harris (1990), coalescence is an elemental fusion operation while diphthongisation is elemental fission. Vowel reduction is seen as the loss of an element in weak positions (Harris 2004). Let us consider diphthongisation, coalescence and vowel reduction in turn.

3.1.3.1 Diphthongisation as element fission

Consider first diphthongisation data from English, where Harris (1994:100) notes that some dialects have diphthongised the mid vowels [e:] and [o:] to [ai] and [au] in south-eastern England and Australian English. This is seen in the evolution of [be:t] to [bait] 'bait' and [bo:t] to [baut] 'boat'. Diphthongisation is analysed by Harris as the fission of a long vowel into its two component elements. The diphthongisation of [bo:t] 'boat' results in the word [baut] as the expression |AU| splits into two adjacent expressions, |A| and |U|. Likewise, [be:t] results in [bait] as the expression |AI| splits into |A| and |I|.

One benefit of this analysis is that it is clear that whatever the output of diphthongisation is, the input elements are retained, as in /e:/ |AI| > [ai] or |A| |I|. In a binary feature analysis, it is unclear where certain feature values come from. The vowel [e] is specified in FT as [-high, -low, +front, -back]. It is not specified as either [+low] like [a] or [+high] like [i] in the output, so the outcome of diphthongisation and which features are altered seems completely random. The change of features must be captured with a serial rule specifying the outcome. This is not desirable considering the fact that in ET one must simply split an expression into its components to capture the process.[4]

3.1.3.2 Coalescence as element fusion

Coalescence in ET is captured as a process of element fusion. Many Bantu languages such as Xhosa (Casali 2011), Zulu (Harris 1994:99, 2005) and Bemba (Kula 2002) exhibit a strong dispreference for vowel hiatus, and coalescence is found when the vowel [a] precedes the vowels [i] or [u] at a morpheme boundary. Consider the Xhosa data below, consisting of vowel-initial nouns with the genitive prefix /wa-/.

(2) Xhosa nouns with genitive prefix (Casali 2011:1439, citing Aoki 1974)

/wa-inkosi/	[wenkosi]	'of the chiefs'
/wa-umfazi/	[womfazi]	'of the woman'

Representing each of the vowels in elements, it is clear that the output vowels are the product of two simplex expressions, with element fusion accounting for coalescence (Harris 1994). In the case of [wenkosi] 'of the chiefs', the adjacent vowels |A| and |I| undergo fusion to |AI| or [e], while |A| and |U| fuse to |AU| or [o] in [womfazi] 'of the woman'.[5] The same process of coalescence is also active in Zulu, discussed by Harris (1994:99ff), as in /na-inkosi/ [nenkosi] 'and the chief' and /na-umuntu/ [nomuntu] 'and the person'.

[4] This analysis also holds for recent models of Feature Geometry (e.g. Clements & Hume 1995, Hall 2011), though binary features are still retained for certain features.

[5] See Yoshida S. (1996:166-169) for a criticism of coalescence in the analysis of de Haas (1988), who depends on binary features. In short, Yoshida S. points out that to account for Japanese coalescence, the underlying specified features of a vowel such as [a] would have to change arbitrarily to account for variation in the patterning of certain vowels.

3.1.3.3 Vowel reduction as element removal

Now let us consider the phenomenon of vowel reduction, as discussed by Harris (2004). In stressed positions, which Harris considers to be strong positions, many languages exhibit their full vowel system, as in Neapolitan Italian, Belorussian and Catalan. In unstressed position, however, the set of vowels is reduced. In the case of Belorussian, the vowels [a], [i] and [u] are found in stressed and unstressed nuclei, but stressed [ó] and [é] alternate with unstressed [u] and [i] as in [kól] 'pole, NOM' ~ [kulá] 'pole.GEN' and '[ʃépt] 'whisper'~[ʃaptátsʲ] 'to whisper' (Harris 2004:3). Consider the following Belorussian vowel pattern drawn from Harris (2004:3), with ET representations shown below each expression.

(3) Belorussian strong and weak position vowel inventory

Strong position	i |I|	e |AI|	a |A|	o |AU|	u |U|
Weak position	i |I|		a |A|	u |U|	

Harris characterises the element set of the strong position as the full inventory, while the vowels found in the weak position are fewer due to the reduction of the elements in an expression. Belorussian vowel reduction can be characterised simply as the removal of |A| in unstressed positions. Harris claims that this is a change which feature theory cannot robustly capture; vowel reduction would be analysed as a replacement of feature matrices (Harris 2004:10). The change of [é], which is [-high, -low, -back, +front] to [i] or [+high, -low, -back, +front] requires the change of [-high] to [+high], but this would be driven once again by an arbitrary rule.[6]

3.2 Generating and restricting vowel inventories in ET

Recall that the following vocalic expressions are produced from the basic elements |A|, |I| and |U|.

[6] Another strength of Harris's analysis is that the amount of contrast afforded to a stressed position is directly linked to its stressed nature; Harris (1992, 1997, 2003) has noted in the past that the ability of a strong position in a word to support certain expressions is derived from its licensing potential. In simple terms, strong positions can support more elemental expressions than weak positions. When a nucleus is in the weak position of a foot, for example, elements are lost due to diminished licensing potential and onset consonants undergo lenition or elision. The weak position or site of lenition is also argued to be a consonant preceding an empty nucleus or vowel. For more see Harris (1992), Ségéral & Scheer (2008) and Cyran (2010) for varying proposals and references. The relevance of the foot is discussed in Harris (2003, 2013) and references therein.

(4) Three elements and seven possible expression

|A| [a]
|I| [i]
|U| [u]
|AI| [e]
|AU| [o]
|IU| [y]
|AIU| [ø]

Assuming this set of expressions with headedness excluded, we can characterise the five-vowel inventory of Tokyo Japanese as follows, which contains the vowels {a, i, u, e, o}.

(5) The Standard Japanese vowel inventory (preliminary)

i |I| u |U|

e |AI| o |AU|

a |A|

The three elemental expressions and two combinations are sufficient to generate a five-vowel system, as found in Tokyo Japanese. However, some languages have larger vowel inventories that require more than seven elemental expressions. Owari Japanese is one of these, with eight vowels {a, i, u, e, o, æ, y, ø}.[7] With the three vocalic elements alone, we cannot generate all of the necessary contrasts for vowel systems. How does the theory differentiate between vowels with similar qualities? With no further mechanisms to enrich the theory, we cannot generate the contrast found in Owari Japanese between [e] and [æ], both composed of the open element |A| and the front element |I|.

3.2.1 Heads and operators

To increase the generative power of the theory and allow for further encoding of contrast in vowel inventories, ET has a distinction within expressions between heads and operators. From the acoustic point of view, it has been proposed that a headed expression is an element expressed in a stronger manner within the acoustic signal (Harris & Lindsey 1995), with English headed $|\underline{I}|$ representing [i], and unheaded |I|

[7] I discuss the specification of the Owari inventory as having eight vowels in 3.2.4.

representing [ɪ]. From a phonological point of view, heads and operators will often display different potentials with regards to phonological processes such as vowel harmony (Charette & Göksel 1996, Cobb 1997, Harris 1994, Marten 1996, Kula 2002). Heads may also license operators within an expression, but headless expressions are also found in weak positions and as lax vowels in certain languages.

Headedness provides potential contrast between expressions such as $|\mathrm{A}\underline{\mathrm{I}}|$ with |I|| as head, realised as [e], versus the expression $|\mathrm{I}\underline{\mathrm{A}}|$ with |A| as head, which is realised as [æ] or [ɛ]. When |I| is head, the front quality of a vowel is emphasised, while openness is emphasised when |A| is head. Only one head is permitted per expression. In all expressions, I represent heads as underlined in the right-hand position. Unheaded expressions are also permitted by the theory. Roughly speaking, a headed expression represents tense vowels and headless expressions represent lax vowels (see Cobb 1997, Kaye 2000), as in the English contrast between $|\mathrm{A}\underline{\mathrm{U}}|$ or [o] and |AU| or [ɔ].[8]

Two possible representations of the Tokyo Japanese vowel system with headedness are shown below. As Japanese shows no contrast between tense and lax vowels, I assume that there are no unheaded expressions in Japanese.

(6) Tokyo Japanese vowel inventory with headedness (Option 1)

i $|\underline{\mathrm{I}}|$ u $|\underline{\mathrm{U}}|$

e $|\mathrm{I}\underline{\mathrm{A}}|$ o $|\mathrm{U}\underline{\mathrm{A}}|$

a $|\underline{\mathrm{A}}|$

(7) Tokyo Japanese vowel inventory with headedness (Option 2)

i $|\underline{\mathrm{I}}|$ u $|\underline{\mathrm{U}}|$

e $|\mathrm{A}\underline{\mathrm{I}}|$ o $|\mathrm{A}\underline{\mathrm{U}}|$

a $|\underline{\mathrm{A}}|$

[8] It can be argued that the headed or unheaded status of an expression is not in fact a property of the expression itself but affected by foot structure or the licensing of vowels within a word at projections. See Cobb (1997) and Charette (In Press) for discussion of the syntagmatic relation between unheaded and headed expressions in a word.

In terms of generative capacity, six elements plus the condition on single headedness is sufficiently powerful to generate all necessary possible contrasts in language. Jensen (1994) and Breit (2013) have shown that six elements for vowels and consonants plus the single-headedness conditions generates a set of 256 possible segments.[9] Note that increasing the amount of elements to seven or eight allows for 576 and 1,280 possible segments respectively, while binary feature theory permits up to 1,048,576 possible segments. The large majority of possible segments generated by FT are never attested.

The problem of overgeneration is not just a problem for FT. This criticism also applies to older versions of ET (KLV 1985, see also Kaye 1990c and Coleman 1990). Charette & Göksel (1994) have pointed out that overgeneration was indeed a concern in earlier ET work, and so the number of elements was reduced to six.[10] However, as Charette & Göksel note, even with a reduction of the system to six elements, unattested expressions are generated without further constraints to the theory. A total of 256 possible segments is a great reduction from the predictions of earlier ET but it is clear that the theory must be restricted further. Considering only the elements |A| |I| and |U|, the following expressions are generated.

(8) Generated vocalic expressions without further constraints on the theory

Unheaded Expressions		Headed Expressions		
|A|	|AI|	$\|\underline{A}\|$	$\|A\underline{I}\|$	$\|I\underline{U}\|$
|I|	|AU|	$\|\underline{I}\|$	$\|I\underline{A}\|$	$\|U\underline{I}\|$
|U|	|IU|	$\|\underline{U}\|$	$\|A\underline{U}\|$	$\|AI\underline{U}\|$
	|AIU|		$\|U\underline{A}\|$	$\|AU\underline{I}\|$
				$\|IU\underline{A}\|$

Assuming that there are no restrictions on the fusion of elements, 19 expressions are generated from the condition on single headedness and three elements for vowels.[11] If a language permits an empty expression to be phonetically interpreted an additional 20th 'vowel' may exist in the surface vocalic inventory as in Moroccan Arabic or Turkish (discussed in Chapter 6).

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[10] Further proposals have been made to reduce the amount of elements even further. See Jensen (1994), Pöchtrager (2006) and Pöchtrager & Kaye (2014) for various proposals.

[11] Quantity of vowels or consonants is determined by the association of elements to prosodic constituents or positions.

Unrestricted generation does not seem to be an attested possibility; I know of no language that takes advantage of the full representational possibilities shown above. Even if a language could be argued to have 19 vowels with the above representations, these expressions are not needed for Standard Japanese or Owari Japanese. Tokyo Japanese only contains a five-vowel system. To tailor the generation of vowels, I now introduce licensing constraints.

3.2.2 Constraining element generation: licensing constraints

To further restrict the generative capacity of ET and allow for language specific inventories, Charette & Göksel (1994, 1996) have proposed that Licensing Constraints (LCs) further refine the generation of elemental expressions.[12] LCs are parameters which permit or restrict the role an element must or cannot occupy within an expression as well as its licensing ability.[13] Cobb (1997) and Ploch (1999) have further investigated the role of licensing constraints, though I do not discuss the ontology of constraints here.

The final constraint set for a language is determined on the one hand by reaching the necessary vowel inventory but also by capturing the behaviour of elements with regards to phonological processes such as vowel harmony (e.g. Charette & Göksel 1996, Cobb 1997, Kula & Marten 2000).[14]

3.2.3 Capturing the Tokyo inventory

To generate a five-vowel system as for Tokyo Japanese, there are two possible constraint settings. Recall that the set of Tokyo Japanese vowels is {a, i, u, e, o}. We must restrict our generated system such that we have no contrast between headed and headless expressions, as there is no tense and lax vowel contrast. We also aim to have no contrast between complex expressions such as |A$\underline{\text{I}}$| and |I$\underline{\text{A}}$| as there is no contrast between mid vowels such as [e], [æ] and [ɛ]. We also aim to prevent combinations such as *|IU| or *[y] and *|AIU| or *[ø] as Tokyo Japanese lacks front round vowels. I propose the first of two possible constraint settings below as well as the generated vowel inventory.

[12] See also Kaye (2001) and Kula (2002) for discussions of LCs.

[13] In a sense, LCs are not constraints as much as they are characterisations of element licensing potential.

[14] See also Kula (2002) for discussion of a separate constraint set which accounts for vowel harmony processes, known as Processing Constraints (PCs), with LCs generating only the vowel inventory.

(9) Tokyo Licensing Constraints, Option 1

i. Operators must be licensed

ii. A must be head

iii. I and U may not combine

Generated inventory 1:

i |$\underline{I}$| u |$\underline{U}$|

e |I$\underline{A}$| o |U$\underline{A}$|

a |$\underline{A}$|

In the generated expressions above, all simplex expressions are headed and in the complex expressions |I$\underline{A}$] and |U$\underline{A}$|, the head |$\underline{A}$| licenses |I| or |U|. ‘Operators must be licensed’ prevents the generation of contrastive lax or [-ATR] vowels. Alternative mid-vowel expressions such as *|A$\underline{I}$ are prevented through the constraint ‘|A| must be head’. The generation of the expressions *|IU| for [y] and *|AIU| for [ø] are prevented through the constraints the constraint ‘I and U may not combine’. If this last constraint were not included, there would be the possibility of generating *|IU$\underline{A}$| for Tokyo Japanese, which is never attested.

Now consider an alternate set of constraints which generates the relevant five-vowel inventory of Tokyo Japanese.

(10) Tokyo Japanese Licensing Constraints, Option 2

i. Operators must be licensed

ii. I must be head

iii. U must be head

Generated inventory 2:

i |$\underline{I}$| u |$\underline{U}$|

e |A$\underline{I}$| o |A$\underline{U}$|

a |$\underline{A}$|

As with the preceding constraint set, 'Operators must be licensed' reflects the lack of unheaded expressions in the Tokyo Japanese inventory. Through the use of the constraints 'I must be head' and 'U must be head', the generation of unattested contrast between expressions such as $|A\underline{I}|$ and $*|I\underline{A}|$ is prevented, as well as the generation of |IU| or [y] and |AIU| or [ø]. |I| and |U| may never combine as one of these elements would need to fulfil the role of operator, violating a constraint. Crucially, this constraint set does not need to refer to an arbitrary constraint such as '|I| and |U| must not combine'. I therefore propose that this constraint and element representation is the correct one.[15]

3.2.4 Coalescence in Owari and the Owari vowel inventory

Turning to Owari Japanese, let us first examine coalescence, which affects vocalic sequences of the shape /ai/, /oi/ and /ui/. These sequences are realised as [æ:], [y:] and [ø:]. Adjectives exhibit coalescence in the Owari dialect upon suffixation of the NP suffix /-i/. The stem-final vowel surfaces unaffected in the past form, with the suffix /-katta/. Consider the data below, with Tokyo forms shown for comparison.

(11) Non-Past and Past adjective formation in Standard and Owari Japanese

Standard NP	Standard Past	Owari NP	Owari Past	Gloss
[hikui]	[hikukat:a]	[hiky:]	[hikukat:a]	'low'
[hiroi]	[hirokat:a]	[hirø:]	[hirokat:a]	'wide'
[semai]	[semakat:a]	[semæ:]	[semakat:a]	'narrow'

In the Owari dialect, /Vi/ sequences undergo coalescence, and all elements are retained in the output long vowel. The element |U| combines with |I| to form the high front rounded vowel [y] or |IU| as in /hikui/ [hiky:] 'low-NP'. The complex expression |AU| or [o] also combines with |I| to form [ø] or |AIU|, as in /hiro-i/ [hirø:] 'wide-NP'. Finally, the expressions |A| and |I| fuse to form the vowel [æ] or |AI| as in /sema-i/ [semæ:] 'narrow-NP'. The Tokyo representation of [hiroi] 'wide-NP' is shown in (12). An example of Owari coalescence is represented below in (13) using only onsets and nuclei.[16]

[15] Yoshida Y. (2006) has proposed an alternate constraint set for Tokyo Japanese, claiming that only |A| may license operators. I note that this permits generation of $|IU\underline{A}|$. Yoshida further proposes that |U| is unheaded to account for accent phenomena and the unrounded nature of Tokyo |U|. I assume that |U| is headed as it causes labialisation of a preceding [h], discussed below. I consider dispreferred accent sites in Chapter 6, 7 and 8.

[16] I use non-branching onsets and nuclei for the representations of Japanese words. I discuss the representation of Japanese syllable structure in following chapters.

(12) Tokyo [hiroi] 'wide-NP'

$$\begin{array}{cccccc} O_1 & N_1 & O_2 & N_2 & O_3 & N_3 \\ | & | & | & | & & | \\ x & x & x & x & & x \\ | & | & | & | & & | \\ h & i & r & o & & i \\ & & & |A\underline{U}| & & |\underline{I}| \end{array}$$

(13) Coalescence in Owari [hirø:] 'wide-NP'

a . Fusion of |AU| of |I|

$$\begin{array}{cccccc} O_1 & N_1 & O_2 & N_2 & O_3 & N_3 \\ | & | & | & | & & | \\ x & x & x & x & & x \\ | & | & | & | & & | \\ h & i & r & o & & i \\ & & & |AU| & & |I| \end{array}$$

b. Surface representation of [hirø:] 'wide-NP'

$$\begin{array}{cccccc} O_1 & N_1 & O_2 & N_2 & O_3 & N_3 \\ | & | & | & | & & | \\ x & x & x & x & & x \\ | & | & | & | & & \\ h & i & r & ø & & \\ & & & |AIU| & & \end{array}$$

The Tokyo form is shown in (12) where the relevant vowels are adjacent, while in the Owari form in (13) the elements of the adjacent nuclei have fused. This expression is then realised as a long vowel, with the elemental material spread over two nuclear positions; I discuss this structure of long vowels in Chapters 6 and 7.

In terms of the elements, we must differentiate the vowel [æ] in Owari Japanese (which is a product of coalescence) from the mid vowel [e]. Both vowels are composed of the elements |A| and |I|. This is exceedingly clear in the case of coalescence, as [æ] is the output of the fused |A| and |I| elements, while the composition of [e] has been defined for Tokyo Japanese as |A$\underline{\text{I}}$|. I assume the same representation for /a, i, u, e, o/ in both Tokyo and Owari Japanese. I recall the vocalic expressions below.

(14) The representation of /a, i, u, e, o/

i $|\underline{I}|$ u $|\underline{U}|$

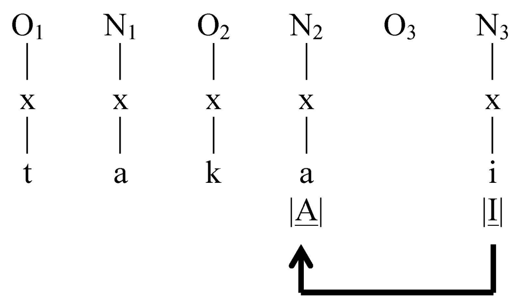
e $|A\underline{I}|$ o $|A\underline{U}|$

a $|\underline{A}|$

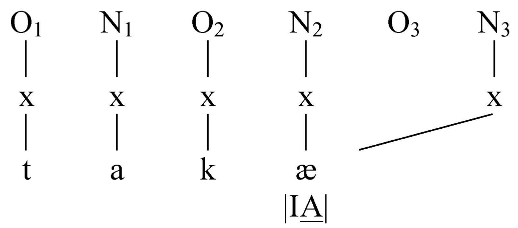
If we assume that Owari and Tokyo Japanese have the same set of expressions for the vowels {a, i, u, e, o}, we can capture coalescence as the fusion of |I| as operator into the preceding nuclear expression.[17] This is shown below in the derivation of /taka-i/ [takæ:] 'tall-NP'.

(15) Derivation of /taka-i/ [takæ:] 'tall-NP'

a. Fusion of $|\underline{A}|$ and |I| as operator



b. Surface representation of [takæ:] 'tall-NP'



When two expressions fuse, one of the elements must be demoted to head as only one head is permitted in an expression. If the role of |I| as head in its own expression is demoted to that of operator when fused into N_2 above, we have the vowel $|I\underline{A}|$, interpreted as [æ]. If $|\underline{I}|$ remained as head and $|\underline{A}|$ was demoted to operator, the output would be identical to the lexical vowel $|A\underline{I}|$, giving *[take:]. Following the same line of thought, |I| is fused as operator into the expressions $|\underline{U}|$ and $|A\underline{U}|$, giving rise to the expressions $|I\underline{U}|$, interpreted as [y], and $[AI\underline{U}|$, interpreted as [ø]. This is seen in the Owari adjectives /omo-i/ [omø:] 'heavy-NP' and /furu-i/ [fury:] 'old-NP (Field notes,

[17] With the exception of coalescence and accent spreading (discussed in chapter 8), the two dialects are similar in their phonological patterning.

April 2013; see also Ebata 2013). In sum, coalescence which creates fronted vowels is the result of fusion of |I| as operator. The surface inventory for Owari Japanese is shown below in (16).

(16) Owari Japanese surface inventory

i |$\underline{\text{I}}$|	y |I$\underline{\text{U}}$|	u |$\underline{\text{U}}$|
e |A$\underline{\text{I}}$|	ø |AI$\underline{\text{U}}$|	o |A$\underline{\text{U}}$|
æ |I$\underline{\text{A}}$|		
	a |$\underline{\text{A}}$|	

While I characterise this inventory as a surface inventory, it is clear that not all instances of coalescence are synchronically derived as in adjectives. The same products of coalescence also occur within nouns, nominal adjectives and adverbs, such as [æ:mæ:] 'unclear', [sy:ka] 'watermelon' and [kø:] 'carp'. The cognate Tokyo forms are [aimai], [suika] and [koi]. When present in nouns, nominal adjectives and adverbs, the vowels never exhibit alternations with /ai/, /oi/ or /ui/. Speakers do not identify the forms containing a diphthong as Owari dialect forms. I assume that if alternations are not evidenced as in nouns, coalescence does not occur synchronically. Representationally, this means that some of the fronted vowels which are the product of coalescence in adjectives are lexically specified in nouns. Recall that the LCs generate the lexical vowel inventory of a language. As a result, the LCs must be altered to generate the eight vowels found in nouns.

In addition, I have found a small number of Owari words exhibiting vowels produced by coalescence which do not etymologically contain the vowel sequence /ai/, such as Tokyo [hae] 'fly', realised as [hæ:] in Owari. The sequence /ae/ is not a context for coalescence, however, and exceptions include [mae] 'in front of' and [kakaeru] 'carry, hold' (Ebata 2013). To account for coalescence in words which etymologically had an /ae/ sequence, I propose that there was reduction of the vowel [e] or |A$\underline{\text{I}}$| to [i] or |I| via loss of the A element, giving a change of Middle Japanese [hae] 'fly' to *[hai]. This reduction does occur synchronically, with [kaeru] 'return home-NP' often being produced as [kairu]. This sequence then triggered coalescence, becoming modern Owari [hæ:]. Such changes cannot be claimed to be synchronic.

As there are cases of vowels produced by coalescence which are not synchronic, I claim that Owari has eight lexical vowels specified in lexical entries. I must adjust the licensing constraints to generate the Owari vowel inventory. The set of Owari licensing constraints and the generated lexical inventory are presented below.

(17) Owari Licensing Constraints[18]

i. All operators must be licensed

ii. U must be head

Generated expressions:

i |$\underline{\text{I}}$| y |I$\underline{\text{U}}$| u |$\underline{\text{U}}$|

e |A$\underline{\text{I}}$| ø |AI$\underline{\text{U}}$| o |A$\underline{\text{U}}$|

æ |I$\underline{\text{A}}$|

a |$\underline{\text{A}}$|

In the resultant Owari inventory, all expressions must have a head which licenses an operator, as in Tokyo Japanese. The difference between the modern dialects is that in Owari the elements |I|, |U| and |A| may all license operators, but |U| must be head if it is present in the expression. Either |I| or |A| may be head otherwise, leading to a contrast in modern speech between [e] and [æ].

3.2.4.1 A note on length

The above Owari vowels are all found as long vowels, but there is a lack of short [y], [ø] and [æ]. Length is not generated by the LCs, but by syllabic structure. I presume that the lack of short counterparts is due to these vowels only occurring from coalescence, which preserved the features as well as the quantity of input vowels. It is possible that some Owari speakers do have short [y], [ø] and [æ], but the current literature and my fieldwork have shown no evidence of this.

3.2.5 Coalescence in the Tokyo dialect

Coalescence also occurs in portions of Tokyo and the surrounding region (Hasegawa 1979, Kubozono 2015b). Coalescence in this dialect is not found everywhere in the region, but is found often in young peoples' speech. It is also

[18] Note that these constraints also generate identical phonological expressions for Québec French, discussed earlier, as well as Finnish (Kaye 2000). Owari Japanese is different from these languages in many others respects, however, as it lacks a long-short contrast for all vowels (which is found in Finnish) and has no lax vowels in closed syllables (as in Québec French).

sometimes described as occurring in the dialect of Eastern Tokyo *shitamachi* or downtown. Consider the data below, which exemplifies Tokyo coalescence.

(18) Tokyo Coalescence (Kubozono 2008:152, transcription modified)

	Tokyo	Conservative	Gloss
a.	[ite:]	[itai]	‘painful-NP’
b.	[suge:]	[sugoi]	‘great-NP’
c.	[atɕi:]	[atsui]	‘hot-NP’

For those Tokyo speakers who exhibit coalescence, the vowel sequences /ai/ and /oi/ are realised as [e:], while /ui/ is realised as [i:].

3.2.5.1 Element Theory analysis

I propose that the difference between coalescence in the Tokyo dialect and the Owari dialect is the role of |I|, with |I| taking on the role of operator after fusion in Owari, while |I| takes on the role of head and licensor in Tokyo Japanese.[19] In Tokyo Japanese, coalescence occurs in the same conditions as in Owari. However, the |U| element is consistently lost. The data is repeated below with elemental representations shown to the right.

(19) Tokyo Coalescence

	Tokyo	Conservative	Gloss	
a.	[ite:]	[itai]	‘painful-NP’	$\|\underline{A}\| + \|\underline{I}\| = \|A\underline{I}\|$
b.	[suge:]	[sugoi]	‘great-NP’	$\|A\underline{U}\| + \|\underline{I}\| = \|AU\underline{I}\|$
c.	[atɕi:]	[atsui]	‘hot-NP’	$\|\underline{U}\| + \|\underline{I}\| = \|U\underline{I}\|$

The analysis I present in the output forms shows the lack of an unrounded result as the loss of |U|.[20]

I first propose that |I| fuses as head in Tokyo coalescence. When affecting |A|, this results in the expression $|A\underline{I}|$, giving [e:] as in /taka-i/ [take:] ‘tall-NP’. The resulting expression is exactly the same as the lexical vowel [e], $|A\underline{I}|$. When $|\underline{I}|$ fuses with $|A\underline{U}|$ or $|\underline{U}|$, |I| is the head of the resulting expression while |U| is lost entirely, giving $|A\underline{I}|$ and $|\underline{I}|$ as in /omo-i/ [ome:] ‘heavy-NP’ and /furu-i/ [furi:] ‘old-NP’. I claim that this is due to the licensing relations with |I| as head. Recall that the head of an expression must license operators within the expression. I propose that in Tokyo Japanese coalescence,

[19] For a binary feature and rule-based analysis, see Kubozono (2015b).

[20] In a previous ET analysis of coalescence, Yoshida S. (1996) has analysed both Tokyo and Owari coalescence, though his analysis relies on the use of element tiers to account for the variation rather than LCs.

|$\underline{\mathrm{I}}$| as head cannot license |U| as operator; recall that |I| and ||U must be head in the LCs given above. The conflict of headship is resolved when |I| is fused as head and |U| is lost. A constraint on headedness is never violated.

3.2.6 Accounting for monophthongisation in Tokyo and Owari

On a final note regarding vocalic phenomena, ET can easily account for processes of monophthongisation, which has occurred in Japanese affecting LMJ /ei/ and /ou/, now realised as [o:] and [e:] in both Owari and Tokyo. This is seen in the words [kire:] 'pretty' and [ro:soku] 'candle', orthographically <ki.re.i> and <ro.u.so.ku>, or <きれい> and <ろうそく>.[21] While this process is likely diachronic, it is easily accounted for in ET as the spread of the element |A|. This is shown below.

(20) Spread of |A| in [kire:] 'pretty', from former [kirei]

O_1	N_1	O_2	N_2	O_3	N_3
|	|	|	|		|
x	x	x	x		x
|	|	|	|		|
k	i	r	e		i
			|$\underline{\mathrm{I}}$|		|$\underline{\mathrm{I}}$|
			|A|	>>>	

(21) Spread of |A| in [ro:soku] 'candle', from former [rousoku]

O_1	N_1	O_2	N_2	O_3	N_3	O_4	N_4
|	|		|	|	|	|	|
x	x		x	x	x	x	x
|	|		|	|	|	|	|
r	o		u	s	o	k	u
	|$\underline{\mathrm{U}}$|		|$\underline{\mathrm{U}}$|				
	|A|	>>>					

3.2.7 Conclusion of 3.2

In this section, we have considered the generation of vowel inventories and their representation within Element Theory. I have proposed two separate vowel inventories for Owari and Tokyo Japanese. I have also captured coalescence in the two dialects as the fusion of |I| as operator for Owari Japanese and the fusion of |I| as head in Tokyo Japanese. I have concluded above with a brief account of monophthongisation for the historical diphthongs /ei/ and /ou/, which are now realised as [e:] and [o:] in Owari and

[21] These diphthongs may be realised in formal speech as an effect of hypercorrection, though most speakers see this as extremely odd and unnatural in everyday speech.

Tokyo under the influence of |A|-spread. Now let us turn to ET and the consonants of Japanese.

3.3 Consonants

In this section, I briefly discuss the representation of Japanese consonants. The representation of consonants and their relevant LCs remains under debate, with many proposals given in the literature. I do not revisit the evidence for consonantal representation; proposals are found in Harris & Lindsey (1995), Ploch (1999), Nasukawa (2000), Kula (2002), Botma (2004), Bellem (2007) and Backley (2011) among others. To my knowledge, the only works which use LCs for consonants are Kula (2002, 2005) and Balcı (2006). I do not discuss the theory of consonantal LCs for reasons of space. I provide the rough categories for the consonantal interpretation of each element below, drawn from Revised Element Theory (Ploch 1999). Further correlates besides these are discussed in Bellem (2007) and Backley (2011).

(22) Elements and their consonantal correlates

|A|	Coronal resonance
|I|	Palatal resonance
|U|	Labial resonance
|ʔ|	Glottal closure
|H|	Aspiration and frication
|L|	Voicing and nasality

I present below the structure of Japanese consonants within ET. Those consonants which are the result of assimilation are presented in italics, while those marked with an asterisk are discussed further in 3.3.1. I discuss assimilation in 3.3.2 and lenition in 3.3.3. The below consonants are found in both Owari and Tokyo Japanese.[22]

(23) The representation of Japanese consonants

a. Tap and glides		b. Nasals	
r	|<u>A</u>|	N	|<u>L</u>|
j	|<u>I</u>|	m	|ʔU<u>L</u>|
w	|<u>U</u>|	n	|A<u>L</u>|
		ŋ	|ʔ<u>L</u>|

[22] The only possible controversial representation here is that of velars, which is unmarked for place. Following previous work, I assume that their place is unmarked (KLV 1985, Harris 1994, Ploch 1999) and that velar is the default interpretation of a stop. This is partially supported by considering the Japanese historical lenition of /k/, where lenition to zero is the only possible result of lenition for this consonant. This is due to loss of the element |ʔ|, which is the only element in the expression for [k].

c. Obstruents		d. Fricatives	
t	|Aʔ̲|	h	|H̲|
d	|ALʔ̲|	s	|AH̲|
p	|Uʔ̲|	z	|ALH̲|
b	|ULʔ̲|	***ɕ****	|AIH̲|
k	|ʔ̲|	***ç***	|IH̲|
g	|Lʔ̲|	***ɸ***	|UH̲|
e. Palatalised consonants		f. Affricates	
p^j	|Uʔ̲| - |I̲|	***ʥ****	|IALʔ̲|
b^j	|ULʔ̲| - |I̲|	***ʨ****	|IAʔ̲|
k^j	|ʔ̲| - |I̲|	ts	|Aʔ̲| - |AH̲|
g^j	|Lʔ̲| - |I̲|		
m^j	|UL̲| - |I̲|		
n^j	|AL̲| - |I̲|		
h^j	|H̲| - |I̲|		

A few assumptions are made in the above representations. Firstly, I assume that velar place lacks an elemental specification, following KLV (1985). Second, voiced consonants are represented using |L|, with voiceless stops containing no marked laryngeal element.[23] Regarding the relationship between nasality and voicing, I agreed with the literature which assumes that nasality and voicing are one unified prime, |L| (Ploch 1999, Nasukawa 2000, Botma 2004). While Ploch and Nasukawa assume that |L̲| as head correlates to voicing and |L| as operator represents nasality in consonants, the opposite hypothesis that headed |L̲| is nasality and |L| is voicing is found in Kula (2002) and Breit (2013). I assume the latter relation of |L| for voicing and |L̲| as nasality to capture the natural class of nasals and to retain a natural class for all voiced and plain stops as |ʔ̲|-headed.

Consonants with secondary palatal articulation are not captured as one expression, but two expressions associated to one position, shown in (24). A similar representation is assumed in Labrune (2012a). The lack of palatal consonants preceding /i/ and /e/ can be accounted for by claiming that Japanese does not permit two headed |I̲| expressions within the same syllable, which also accounts for a lack of *[je] and *[ji].[24] The alveo-palatal affricates [ʨ] and [ʥ] require further comment below, but the

[23] Contrast this with a language which has aspiration such as English, marking a contrast between stops with |H| and plain stops, while a true voicing language contrasts stops with |L| and without (Harris 1994). Japanese encodes |L| for voicing in its stops and this is shown by the behaviour of *rendaku*, which is analysed as the insertion of |L| unless |L| is already present in the system (Nasukawa 2000). I assume that |H| is not a property of stops in Japanese as |H| is not targeted in phonological processes. For further discussion of laryngeal systems, see Harris (1994), Honeybone (2005) and Cyran (2014).

[24] See Yoshida S. (1996) for the representation of these consonants as an onset /C/ followed by a light diphthong, /ja/ /ju/ or /jo/ associated to the nucleus.

affricate [ts] is shown in (33b) as two elemental expressions associated to one position.[25] I do not discuss the segment [ts], but see Yoshida S. (2001) for one possible analysis.

(24) Representation of [pʲ] and [ts] as contour segments.

a.
```
     O
     |
     x
    / \
   p   j
  |ʔ| |I|
  |U|
```

b.
```
     O
     |
     x
    / \
   t   s
  |ʔ| |H|
  |A| |A|
```

3.3.1 The status of [tɕ], [dʑ], and [ɕ].

The alveo-palatal segments [tɕ], [dʑ], and [ɕ] have an interesting distribution. Firstly, they appear preceding the vowel /i/ as allophones of /t/, /d/ /z/ and /s/. In addition, these segments are found as the palatal counterparts of /t, d, s/ rather than the segments *[tʲ], *[dʲ], *[zʲ] and *[sʲ]. The alveo-palatal segments are never found preceding /e/ in Tokyo and Owari Japanese. This places these segments in a rather odd place, as they are derived preceding /i/ for certain verbs, but otherwise their distribution is static.

Vance (2008), Irwin (2011) and Labrune (2012a) all propose that due to the influence of loanwords, the alveo-palatal segments are all found preceding /e/ and that the alveo-palatal segments are phonemic. Note that /t/ and /d/ also occur preceding /i/ under the influence of loanwords, though their realisation may vary. I agree with the literature in assuming that the alveo-palatal segments are defined in the lexicon, though they may also be derived preceding /i/. Consider the traditional distributions of these sounds shown and their innovative distribution below.

(25) Conservative distribution of alveolar and alveo-palatals

a. [tɕ, dʑ, ɕ] found preceding /a,u,o/ and /i/ as allophone

b. [t, d, s, z] found preceding /a, e, u, o/

[25] I assume that [dz] is a phonetic variant of [z], with no phonological affrication.

(26) Innovative distribution of [tɕ], [dʑ], [ɕ]

a. Expanded distribution of [tɕ], [dʑ], [ɕ] preceding /e/ (Irwin 2011:72)

[tɕeko]	'Czech, Czech Republic'
[dʑesutɕa:]	'gesture'
[ɕeɸu]	'chef'

b. Expanded distribution of [t], [d]

[ti:]	'tea'
[di:bui:di:]	'DVD'

One other innovation in modern innovative speech is the increased distribution of [ɸ], created solely through loanwords. In addition to Irwin's examples above, one will often come across the combination of [ɸ] plus vowels besides [u] in technology or advertising terminology, such as [ɸesuta] 'festa' for advertising or [ɸe:subuk:u] for 'Facebook'. I assume that [ɸ] is also specified in the lexicon for innovative speakers preceding vowels other than /u/, though I hesitate to include this segment in the list of segments specified in the lexicon as I cannot confirm that most speakers can accurately pronounce these loanwords.[26]

3.3.2 Synchronic assimilation processes

I now discuss assimilation processes below. Assimilation affects alveolar stops and fricatives, the glottal fricative [h] and the syllabic nasal, which I represent as |L̲|. All assimilation processes are captured as the spread of elements.

The change of an alveolar stop or fricative to an alveo-palatal stop or fricative is found when preceding the vowel |I̲| or [i]. As noted above, this may not apply in loanwords. In ET, this process is captured as spread of the |I| element as operator from the nucleus into the preceding onset. Yoshida S. (1996:32) discusses this process under the same terms. This is shown below for /t/ and /s/.

[26] Irwin (2011) also argues in favour of recognizing [ts] as an underlying segment (or phoneme), but some of the words given are even more marginal than those above, e.g. [kantso:ne] 'canzone'. Irwin (2011:72) also claims that assimilation and affrication affecting the segments /t/ and /d/ is no longer synchronic in modern speech, as these sounds are now found preceding /i/, as in [ti:] 'tea' and [tatu:] 'tattoo', rather than [tɕi:] and [tatsu:]. Another example is [di:bui:di:] 'DVD'. I suppose that pronunciation of these sequences in loanwords may be dependent upon speakers' age and familiarity with loanwords and foreign languages. Further research on this point is necessary.

(27) Palatalisation of /t/ and /s/ through |I| spreading

a. O N | x x | tɕ i | |ʔ| |I| | |A|

b. O N | x x | ɕ i | |H| |I| | |A|

While |I| assimilation also occurred diachronically for /z/ and /d/, I do not propose that |I|-spreading is synchronic. I presume that the segment [dʑ] is lexically specified preceding /i/. Recall that the realisation of /z/ and /d/ preceding /i/ has merged diachronically to [dʑ], though a distinction between [dʑ] and [ʑ] existed historically and is retained in certain dialects.

The alveo-palatal segment [dʑ] as a result of assimilation separately occurs as the *rendaku* counterpart of [tɕ] and [ɕ], discussed previously in Chapter 1. *Rendaku* (or sequential voicing) is captured in ET as the insertion of the |L| element in the relevant morphological context (Nasukawa 2000, see also Itō & Mester 1986, Vance 2015). Two representations for the voiced counterparts of the alveo-palatal fricatives are shown below as products of *rendaku*.[27] This is found in the forms /toN-ɕiru/-[tondʑiru] 'pork bone soup' and /hana-tɕi/ 'blood' = [hanadʑi] 'bloody nose'. The added |L| is shown is bolded and italicised.

(28) Representation of voiced alveo-palatal affricates as a result of *rendaku*

a. O N | x x | tɕ i ↓ dʑ | |ʔ| |I| | |A| | |I| | ***|L|***

b. O N | x x | ɕ i ↓ dʑ | |H| |I| | |A| | |I| | ***|L|***

[27] I analyse *rendaku* as the insertion of |L|, while Nasukawa (2000) analyses *rendaku* as the activation of the |L| element (or rather, the |N| element in Nasukawa's work). Nothing crucial hinges on the interpretation of *rendaku* here.

Note that the voiced counterparts of [tɕ] and [ɕ] are represented differently in terms of elements, but they are both interpreted as [dʑ]. Their underlying representation is distinct, and thus their post-*rendaku* forms are also distinct phonologically, if not phonetically.[28] These elemental combinations do not both occur in the lexicon, however. I represent lexical [dʑ] as |LIAʔ|.

Now let us consider assimilation which affects [h] and [N]. The glottal fricative [h], which I represent as |H|, is realised as the palatal fricative [ç] preceding [i] as in [açiru] 'duck'. Preceding the vowel [u], it is realised as the bilabial fricative [ɸ]. I analyse the former case as spread of the |I| element, while I assume the latter is a case of |U| spreading, following Yoshida S. (2006). I assume that this only occurs preceding [i] and [u] and not [e] and [o] as the spreading element must be a head without an operator in order to license itself in the preceding onset, i.e. |I| and |U| trigger assimilation but never |AI| or |AU|, as the head of these expressions is licensing an operator.

(29) Assimilation affecting |H|

a.	O	N	b.	O	N
	x	x		x	x
	ç	i		ɸ	u
	|H|	|I|		|H|	|U|

Finally, let us consider the place assimilation of the syllabic nasal N. Yoshida S. (2003) proposes that N is the floating nasal element |L| which assimilates to a following consonant where one is available. Otherwise, the nasal assimilates to the preceding vowel in casual speech and is realised as a nasal vowel. See also Vance (1987:35; 2008) for a proposal where N is a nasal glide. Consider the following data.

[28] This of course assumes that these words are productively formed with *rendaku* as an active process. If the morphological composition and *rendaku* in these forms is not considered synchronic, then the representation of [dʑ] in [hanadʑi] 'nosebleed' and [tondʑiru] 'pork broth' is the same as the representation of [dʑ] found elsewhere, as in [dʑoɕi] 'girl' which is |LIAʔ|.

(30) Syllabic nasal assimilation

a. Preceding a consonant

/hoN+de/	[honde]	‘book-by’
/hoN+ga/	[hoŋga]	‘book-NOM’
/hoN+bako/	[hombako]	‘book-box’

b. Preceding a vowel

/nihoN+e/	[nihoõe]	‘Japan-LOC’
/taN’i/	[taãi]	‘credit’

Yoshida S. (2003) accounts for the above data by assuming that when a following consonant is present, elemental material spreads into the preceding syllabic nasal. If no onset follows, the nasal associates to the nucleus and gains any elements from the preceding vowels. I represent the syllabic nasal N as |L|.[29]. Note that that Yoshida S. ignores the vowel nasalisation discussed in Chapter 1 and discussed in the literature elsewhere (Vance 1987, 2008; Labrune 2012a). I do not revise the representation of the moraic nasal N here, and this will be covered in chapters 6 and 8.

(31) Representation of [nihoõ] in [nihoõe] ‘Japan-LOC’

O_1	N_1	O_2	N_2	O_3	N_3
|	|	|	|		|
x	x	x	x		x
|	|	|	|		|
n	i	h	o		õ
					|L|
			|U|	>>	
			|A|	>>	

(32) Representation of [hommo] ‘book-as well’

O_1	N_1	O_2	N_2	O_3	N_3
|	|	|		|	|
x	x	x		x	x
|	|	|		|	|
h	o	m		m	o
		|L|		|L|	
			<<	|U|	
			<<	|ʔ|	

[29] Yoshida S. (2003) uses the nasal element |N| from earlier ET, but I revise the representations and use the merged usage of |L| and |N| argued for by Ploch (1999) and Nasukawa (1997, a2005).

3.4 Conclusion of Chapter 3

In this chapter, I have introduced Element Theory (KLV 1985, Backley 2011), focusing on the representation of vowels. Section 3.1 showed how ET captures vocalic processes such as coalescence, diphthongisation and vowel reduction. 3.2 proposed a vowel inventory for Owari and Tokyo Japanese. I have also proposed that the difference for coalescence in these two dialects is between the behaviour of the element |I|, with |I| fusing as operator in Owari Japanese and as head in Tokyo Japanese. In 3.3, I provided a tentative representation of Japanese consonants. These representations will be retained for the remainder of this thesis. Now, let us examine the prosodic structure of Japanese, beginning with the representation of Japanese using the syllable and the mora.

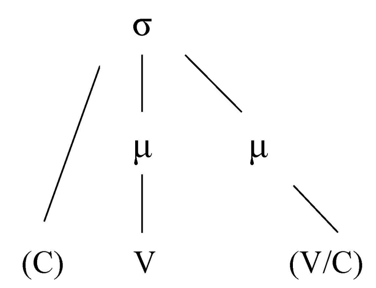
Chapter 4: The Syllable and the Mora in Japanese

In this chapter, I examine evidence for the syllable and mora in Japanese phonological processes. I critically examine the benefits and drawbacks of the use of the syllable, and I argue that use of a syllable constituent is problematic. 4.1 reviews the structure of the syllable and mora. 4.2. examines supporting evidence for the syllable constituent and the mora in Japanese, while 4.3. points out problems with the use of a syllable. In 4.4, I discuss a syllable-free analysis from Labrune (2012a,b) and I conclude with consideration of representations as a way to account for accent assignment facts.

4.1 The prosodic representation of Japanese syllables

Japanese is widely regarded as a mora-counting language. The current consensus is that Japanese uses moras as the unit of accent assignment, but that these moras are organised under a syllable (Kawahara 2015). The unmarked syllable in Japanese is a CV syllable as in the word [ha] 'tooth', while the maximal syllable is typically bimoraic, as in [hoN] 'book' or [koi] 'carp'.[1] The first consonant of a syllable attaches directly to the syllable constituent, while the first vowel attaches to the mora and the following vowel or consonant is associated to the second mora within the syllable. I present a preliminary template below utilising the syllable and the mora below.

(1) The template for a bimoraic syllable

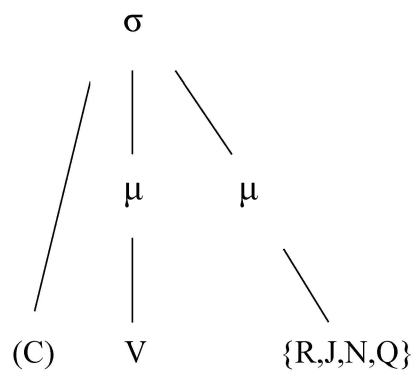


This syllable must be revised, however, as the second mora is restricted in what is available for this position. It may only be the second half of a long vowel, the /i/ portion of a diphthong such as /ai/, the syllabic or moraic nasal N or the first half of a

[1] Trimoraic syllables are seemingly evidenced in loanwords such as [saiN] 'signature', or morphologically complex forms such as [hait.ta] 'enter-PAST'. These words always show evidence of being bisyllabic; see Yoshida S. (1996:88) for discussion of degemination affecting native superheavy syllables in verbs and Kubozono (2001:50ff) for discussion of purported trimoraic syllables in loanwords which exhibit behaviour showing that they are heterosyllablic. I do not discuss this issue further.

geminate.[2] This is reflected in the revised template below, where {R, J, N, Q} are shorthand for vowel length, the second half of a diphthong, the moraic nasal and the first half of a geminate, respectively.

(2) The template for a bimoraic syllable with melodic restrictions



The above syllable template is widely used in Japanese, as in Kubozono (1989) and Vance (2008). The mora as a position under the syllable is used in Japanese generative phonological analyses since at least McCawley (1968), though the mora as a unit of weight was not codified in theory until Hyman (1985) and Hayes (1989). A mora is understood to be a position of weight and timing to which segments associate. As for the syllable, it is said to be necessary to account for the lack of a pitch accent found on a special mora and deaccentuation in genitive case nouns (McCawley 1968, Poser 1984, Vance 1987, 2008; Kubozono 2001, 2008). I discuss these issues below.

The initial consonant of the syllable is not moraic and it is either associated to the syllable directly or associated to the same mora of the nucleus, with Kubozono (1989) presenting both options.[3] I associate the initial consonant to the syllable directly, following Hyman (1985) and Hayes (1995). This consonant is not associated to its own mora as its existence or lack is not considered relevant to pitch accent assignment in Japanese in most cases.[4] Further possible syllable representations are discussed in Labrune (2012a:148ff).

[2] See Itoh (1986:24, 1989) for an alternative proposal using a Coda Condition or Coda Filter, where she uses the syllable with C and V skeletal positions. Under her analysis, a coda may only independently license the feature [+nasal], with all other features being obtained through linking (i.e. in a geminate).

[3] While the consonant preceding the nucleus is colloquially referred to as an onset, it is important to note that there is no onset constituent mediating between the mora and the syllable-initial consonant in a mora-based framework. An onset is used as a constituent in other frameworks such as Government Phonology, discussed in the next chapter.

[4] A lack of a consonant preceding a vowel is of course necessary to capture the behaviour of long vowels, and the diphthongs /ai/, /oi/, and /ui/. See Chapter 7 for more on diphthong formation.

The symbols {J, N, R, Q} in the second mora represent the restricted set of segments found in this position. Since at least Bloch (1950), special mora symbols are commonly used to represent the second half of a diphthong or of a long vowel, the moraic nasal and the first half of geminate[5]. These moras are considered to be archiphonemes in work by Block (1950) and Vance (2008) or underspecified segments (Labrune 2012a,b). According to Labrune (2012a:132ff), in the Japanese phonology tradition, these moras are called 'special beats' (*tokushu haku*), 'special phonemes' (*tokushu onsō*) and 'mora phonemes' (*mora onsō)* with the concept of a beat or *haku* being roughly equivalent to the generative mora. Labrune (2012a) explains that there is no universally accepted set of special moras, but defines special moras as, "…Phonological elements which exhibit special phonological characteristics, the most significant one lying in the fact that they are moraic." (Labrune 2012a:132). It is unclear to me how the second mora within a syllable is restricted without use of a stipulation, though Kawahara (2015) mentions that the second mora within a syllable is a non-head, while the initial mora is the head mora. The segment associated to a 'special mora' is licensed by the syllable constituent, as in the proposal from Itō (1989). The cause of the segmental restriction of the second position of a syllable is discussed in depth below and in following chapters from a generative perspective.

Two recent proposals from Vance (2008) and Labrune (2012a) define special moras as either archiphonemes or underspecified positions. Vance (2008) posits that the special moras consist of the archiphonemes /H/ for vowel length, /J/ for the front off-glide of a diphthong such as /ai/, /N/ for the moraic or syllabic nasal and /Q/ for the first half of a geminate. Labrune (2012a:162) on the other hand proposes that 'special moras' are in fact weak or deficient moras, and she characterises them as sparsely specified positions, gaining their full feature specifications from neighbouring moras. Labrune's proposal is discussed in more detail later in this chapter. Labrune uses the symbol /R/ instead of /H/ for vowel length and eschews the use of /J/ in favour of the segment /i/.

Outside of generative quarters, the special moras are used often in transcription for their convenience. For example, Labrune (2012a) provides the notation /moQte/ for [mot:e] 'hold-GER', /hoN/ for [hoN] or [hoõ] 'book' and /toR/ for [to:] 'tower'. Special moras are also used in the non-generative tradition, such as in the chapters of Iitoyo, Hino & Sato (1982-1986). These transcriptions are often used in analyses solely for

[5] Labrune (2012a) cites Hamada (1949) as an earlier work in which special moras are discussed, but I restrict my discussion in this chapter to Generative usage of such devices. Labrune notes that the special moras are also called the *hatsuon* for /N/, *sokuon* for /Q/ and *choo'on* for /R/ (Labrune 2012a:132).

their descriptive value for Japanese. Now let us examine evidence that has been proposed in support of the mora before considering the evidence in support of the syllable.

4.2 In support of the mora

From McCawley (1968) onwards, the mora has been recognised in the literature as an essential part of Japanese generative phonology. Let us first consider evidence in support of the mora from meter. Poser (1990), among others, has noted that formation of poems such as *haiku* utilise the mora as the unit which is counted rather than the syllable. *Haiku* has a strict five mora/seven mora/five mora template. Poser (1990) gives the following two examples, the first in (3) where the syllable and mora count are equal and the second in (4) where there are fewer syllables than moras. I separate the moras of a single syllable with a dash.

(3) Haiku where the number of syllables = number of moras[6]

na tsu gu sa wa	(5 moras, 5 syllables)
tsu wa mo no do mo ga	(7 moras, 7 syllables)
yu me no a to	(5 moras, 5 syllables)

(4) Haiku where the number of syllables ≠ number of moras[7]

na ra na na e	(5 moras, 5 syllables)
ɕi tɕi do-o ga ra-n	(7 moras, 5 syllables)
ya e za ku ra	(5 moras, 5 syllables)

Multiple examples of this type presented in Vance (1987) and Labrune (2012a) show that metre counting considers only the mora and not the syllable.[8] Further evidence from music is also considered a source of support for the mora, where one note is assigned to one mora in traditional and popular Japanese music (Vance 1987, 2008:127; Tsujimura & Davis 2009).[9]

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[6] Translation from Poser (1990:79): "The summer grass. All that remains of the dreams of brave men."

[7] Translation from Poser (1990:79): "Seven-fold Nara, with its seven temples and double-flowered cherry trees." Note that /Ve/ sequences form hiatus sequences and are heterosyllabic, discussed further in Chapter 7.

[8] It is possible that poetry actually relies on counting orthographic *kana* symbols.

[9] The mora is also proposed to be the unit of manipulation in language games and secret languages (Poser 1990, Labrune 2012a), including language games such as the *babibu* language (Haraguchi 1991) and *shiritori* 'buttock-taking'. Labrune (2012a:146) does note that language games often show dependence on orthography.

4.2.1 The mora and pitch accent

Pitch accent assignment is the most reliable source of support for the mora. Since McCawley (1968), it is widely assumed that the site for default accent placement in loanwords is the syllable containing the antepenultimate mora. The same assumption of antepenultimate accent as default in loanwords and native words is supported, in various approaches, by Haraguchi (1991) Yoshida Y. (1999), Kubozono (2008) and others.[10] Kubozono (2008:170) surveys three-mora nouns, showing that 59% of accented Yamato words, 95% of accented Sino-Japanese words, and 96% of loanwords have antepenultimate accent on the initial mora.

Consider the following words drawn from Kubozono (2001:34), which exemplify loanwords accented on the antepenultimate mora. I separate each syllable with a full stop, while moras within a syllable are divided by a dash. Words with only monomoraic syllables in the ultimate, penultimate and antepenultimate positions are shown in (5a), while words containing bimoraic syllables with a moraic nasal and long vowel are shown (5b). The accented mora is the antepenultimate in all cases, marked with an acute accent. Both the initial mora within a syllable and the second mora within a syllable are counted, as in (5b). These words show that only the mora is counted, not the syllable. I add the predicted accent pattern if the syllable were the unit of accent assignment in (5b), which are all unattested.

(5) Loanword accent (Kubozono 2001:34)

a. [bí.ru.ma]	‘Burma’	
[o-o.su.to.rá.ri.a]	‘Australia’	
[o-o.su.tó.ri.a]	‘Austria’	
b. [de-n.má-a.ku]	‘Denmark’	*[déNmaaku]
[a-i.ru.rá-N.do]	‘Ireland’	*[airúraNdo]
[re.bá.no-N]	‘Lebanon’	*[rébanoN]

The mora is also invoked in issues such as speech error formation, nickname formation and truncation of loanwords. I examine these issues later in this chapter. Before considering other data which utilises the mora, let us briefly consider support for the syllable in Japanese.

[10] Analysis accounting for antepenultimate accent from Yoshida Y. (1999) is discussed in the following chapter.

4.2.2 The relevance of the syllable

With the above pattern established, it is then claimed the syllable is necessary to account for cases of 'accent shift' found in loanwords (Labrune 2012a,b; Kawahara 2015) where antepenultimate accent is expected in a word of three or more moras but pre-antepenultimate accent is found.[11] The full rule for loanword accentuation, stated by McCawley (1968), is as follows:

(6) Loanword Accentuation Rule (McCawley 1968)
Put an accent on the syllable containing the antepenultimate mora.

The antepenultimate accent rule invokes both the mora and the syllable. This rule can accommodate the following loanword accent data in (7) drawn from Kawahara (2015), where accent is found not on the antepenultimate mora, but on the pre-antepenultimate mora. This 'shift' occurs when the antepenultimate mora is one of the special moras /N/, /Q/, /R/ or /J/.

(7) Accent on the pre-antepenultimate mora in loanwords (Kawahara 2015:454)

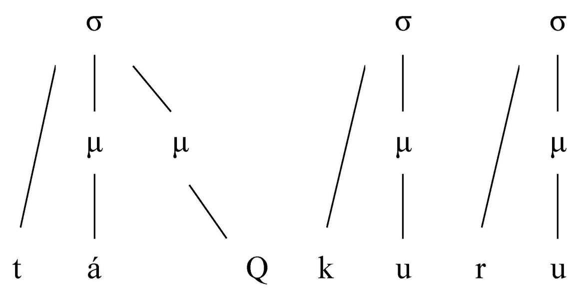
a.	[pa-i.ná-p.pu.ru]	'pineapple'
b.	[tá-k.ku.ru]	'tackle'
c.	[gu.rá-m.pu.ri]	'Grand prix'
d.	[ká-n.za.su]	'Kansas'
e.	[ka.ré-n.da-a]	'calendar'
f.	[pu.rí-n.se.su]	'princess'
g.	[su.nó-o.ke.ru]	'snorkel'
h.	[pá-a.pu.ru]	'purple'
i.	[rá i fu ru]	'rifle'
j.	[ta i pu rá i ta a]	'typewriter'
k.	[ri sá i ku ru]	'recycle'
l.	[bu ró i ra a]	'broiler'

[11] The use of the phrase 'accent shift' might imply that a lexical accent moves, though under McCawley's formalism, no shift is seen – accent is simply assigned not to the antepenultimate mora but the pre-antepenult as an effect of the syllable. I thank Bjarke Frellesvig discussion of this process as 'shift'.

Kawahara (2015) proposes that the antepenultimate mora in the above words is deficient and is the non-head mora within the syllable. Accent is assigned to the antepenultimate mora (the non-head mora) and ‘shifts’ to the head of the syllable, the vowel associated to the pre-antepenultimate mora. The result is the pre-antepenultimate mora bearing the accent.

A syllable-and-mora account would give a representation such as that found in (8) for the word [ták:uru] ‘tackle’. I note the first half of the geminate with the special mora /Q/.

(8) Representation of [tak:uru] ‘tackle’



Above, the accent for the word /tak:uru/ ‘tackle’ is assigned to the antepenultimate mora, that associated to the first half of the geminate represented following the convention as /Q/. The accent is interpreted on the pre-antepenult mora which is the head of the syllable, /a/.

One issue with the above characterisation of accent and the syllable is that it is not clear how the syllable-and-mora account defines a head and a non-head mora and how a non-head mora is forbidden from receiving an accent, though one can assume that this is because the second mora within a syllable is optional.[12] One question this raises is – why is the deficient mora always a dispreferred position for accent in Tokyo Japanese? How does one account for special cases of accentuation on special moras in Tokyo Japanese? This issue is the focus of work by Labrune (2012b), discussed shortly. I examine previous Government Phonology proposals in Chapters 5 and present a novel proposal in Chapter 7. Before moving onto other issues with the syllable, let us consider nasalisation and deaccentuation found in nouns suffixed with the genitive *no* particle.

[12] This excludes any possible discussion of the licensing of moras within a syllable. To my knowledge, the only explicit discussion of licensing in relation to the Japanese syllable is found in non-moraic analysis, such as Itō (1987), Yoshida S. (1996) and Yoshida Y. (1999).

4.2.3 Nasalisation preceding N

Another process used to argue in favour of the syllable is found in the analysis of vowel nasalisation preceding the moraic nasal N. An orthographic word such as <nihoN> 'Japan' is realised as [nihõN]. Scholars such as Vance (2008) claim that the domain of nasalisation is the syllable, as nasal consonants do not trigger nasalisation elsewhere when found in the onset position, e.g. [tani] 'valley' (Labrune 2012a). I revisit this process in Chapter 6, where I argue that N requires a different representation as a non-consonantal segment.

4.2.4 Genitive particle deaccentuation

The syllable is invoked to account for what Kubozono (2001) calls the pre-*no*-deaccenting rule, which occurs when nouns are suffixed with the genitive particle /no/ (McCawley 1968:140ff, Kubozono 2001:44). Kubozono notes that the genitive particle may delete the accent of a noun with final accent, claiming that this is caused by syllabic adjacency. Yoshida Y. (1999:155ff) claims that this is due to the particle /no/ being lexically accented, with accent clash resolution causing deletion of the noun-final accent. Consider the data below.

(9) Genitive deaccentuation (Kubozono 2001:44)

a.	/umá/	+ /nó/	> [umanó]	'horse-GEN'
	/otokó/	+ /nó/	> [otokonó]	'boy-GEN'
b.	/nihón/	+ /nó/	> [nihonnó]	'Japan-GEN'
	/kinóo/	+ /nó/	> [kinoonó]	'yesterday-GEN'
	cf. /ko kó ro/	+ /nó/	> [kokórono]	'heart, spirit-GEN'
c.	/mé/	+ /nó/	> [méno]	'eye-GEN'
	/kí/	+ /nó/	> [kíno]	'tree-GEN'
d.	/kjóo/	+ /nó/	> [kjóono]	'today-GEN'
	/kái/	+ /nó/	> [káino]	'shellfish-GEN'

Kubozono notes that for the accent of the noun to be deleted, two conditions referring to the syllable must be met. The accent of the noun must firstly be found on the final syllable, whether the final syllable is monomoraic as in (9a) or bimoraic as in (9b). Second, the noun must consist of more than one syllable in order for deaccentuation of the noun to occur, otherwise deaccentuation fails to apply, as in (9c) and (9d). If the word has accent on a non-final syllable, as in [kokóro] 'heart-GEN', the accent of the noun remains in the genitive form, as in [kokórono] 'heart-GEN'. The data in (9a) and (9b) are only unified as affected environments if the syllable is assumed as a constituent. Without the syllable and using only the mora, deaccentuation is not expected in (9b) due to a lack of adjacency between the accented mora in /no/ and the accented penultimate mora in the noun.

Further support for the mora is argued to come from the area of speech errors (Kubozono 1989) and processes which refer to a bimoraic foot, such as hypocoristic formation (Poser 1990) and loanword truncation (Labrune 2012a). It is here, however, where problems with the syllable constituent come into focus.

4.3 Problems for the syllable

In this section, I discuss some problematic facts for a syllable-based analysis. While the syllable can account for accent shift and deaccentuation, the syllable predicts tautosyllabic behaviour for the head mora and the non-head mora, which is not always the case. In fact, the two moras found within the syllable are shown to behave as two separate units with regards to pitch accent spreading (Yoshida Y. 1999), footing (Poser 1990), speech errors (Kubozono 1989, 2001) and other phonological processes. Lastly, it is impossible to account for cases of marginal accentuation on special moras (Higurashi 1983, Labrune 2012a). I discuss these issues below.

4.3.1 Pitch accent/tone spreading

First I consider pitch accent or tone spreading, based on data from Yoshida Y. (1999). As we have seen in Chapter 1, accented words have one lexically accented vowel to which a high tone is assigned. Yoshida Y. (1999) notes that high tone spreads leftwards from the accented vowel until the initial vowel in Standard Japanese. Tone spreading does not affect the initial mora (see also Uwano 1977, Haraguchi 1977). This is otherwise analysed as a process of High Tone Association followed by Initial Lowering in a two-tone framework (Haraguchi 1977). This is shown in the data below; I use the annotation from Yoshida Y. (1999) for clarity, with a lexical accent marked with an asterisk and unaccented words having no asterisk. Words with no lexical accent receive a default final high tone.[13] The domain of high tone spread is marked with an overline.

[13] The default assignment of a High tone to the final mora in an unaccented word is attributed variously to default accent assignment rules (Haraguchi 1977, Kawahara 2015), phrasal rules (Pierrehumbert & Beckman 1988) or assignment of an accent through foot structure (Poser 1990, Yoshida Y. 1999, Kubozono 2008 and others). I discuss the assignment of a final accent and antepenultimate accent in further depth in the next chapter.

(10) Initial Accented and Unaccented word pairs (Yoshida Y. 1999:15, 123)

a. Long vowels

[to o ki]	'porcelain'
[ko o ri]	'ice'

b. Diphthongs

[ka i gi]	'meeting'
[ka i te]	'buyer'

c. Geminates

[ta t ta]	'stand.PAST'
[ba t ta]	'grasshopper'

d. Nasal-Obstruent clusters

[te ŋ ka]	'unit cost'
[ke ŋ ka]	'quarrel'

e. Unmarked monomoraic words

[na mi da]	'tears'
[sa ku ra]	'cherry tree'

Consider the behaviour of the long vowels, diphthongs, geminates and nasal-obstruent clusters above. Recall that the first and second moras are tautosyllabic under a syllable-based analysis. Yoshida Y. (1999) proposes that accent evidence points to the independence of the two segments which are supposedly tautosyllabic, such as [kaite] in [kaite] 'buyer' above, where [ka] carries no high pitch, but [i] does.[14]

Labrune (2012a,b) also notes that the syllable makes the wrong prediction with regards to the realisation of an accent in diphthongs and long vowels, posing the question, "…How can we explain that in an accented heavy syllable, the third component…is never of the same pitch as the onset and the nucleus?" (Labrune 2012b:124). Labrune (2012a:146) notes that if the vowels in a long vowel or diphthong were united by the syllable, a fall in pitch between the two moras of a heavy syllable is

[14] These pitch patterns reflect those found in normative speech found in the media, as discussed in Chapter 1. Some speakers do exhibit high pitch on the initial mora when the initial syllable is CVV or CVN but not CVQ. I discuss this pattern in depth in Chapter 8.

not expected, as in [kjóòtò] ‘Kyoto’ (transcription modified).[15] Labrune supposes that that the head mora of a syllable should have the same pitch or tone as the non-head mora if a syllable unifies them.[16] She gives the example of the word [kjóòtò] ‘Kyoto’, with the first mora having a high pitch as the effect of high tone assignment and the second mora within the long vowel having low pitch due to a lack of high tone assignment. Labrune notes that this would not occur in a stress and syllable language such as English, where two different components of a heavy syllable never receive separate accents, though it is important to note that English is generally assumed to assign stress to the syllable, and not the mora.

4.3.2 Speech errors

Further evidence against the syllable is found in speech error data (Kubozono 1989, 2001). Excerpts from the data are shown below. In errors, Japanese may split the two moras within a syllable, shown in metathesis and blend errors below. A syllable boundary is represented by a full stop and a mora boundary is represented with a hyphen, while affected portions of each word are underlined.

[15] This raises the possibility of the syllable being absent in some languages and existing in others (cf. Hyman 1985, 2011). From the point of view presented in Chapter 6, the effect of the syllable of a mora’s deficiency is attributed to the structure of long vowels, diphthongs, moraic nasals and geminates. This is not dissimilar to the proposals from Yoshida Y. (1999) and Labrune (2012a,b), but crucially I use a Strict CV structure (Lowenstamm 1996) and I parameterize the projection of vocalic positions to account for the behaviour of what are typically considered independent and deficient moras.

[16] While it is possible that high pitch could serve to denote the head mora within a syllable, this would predict that the differentiation of a head and non-head mora would be visible in other contexts, such as in high pitch spreading contexts. This is not always the case, cf. discussion in Ch. 1 and 8. The heterogenous tonal association in long vowels and diphthongs can be accounted for easily when one does not assume the syllable unifies them.

(11) Japanese metathesis errors Kubozono (2001:38)

Correct Phrase	Error produced	Gloss
a. a.ra.<u>bu</u>.<u>*dʑi*</u>*-N*	a.ra.dʑi.bu-N	‘arab’
b. <u>ke</u>.<u>*tɕa*</u>*-p*.pu	tɕa.ke-p.pu	‘ketchup’
c. <u>*te*</u>*-k*.ki-n <u>*ko*</u>*-n*.ku.ri-i.to	ko-k.ki-N te-n.ku.ri-i.to	‘ferroconcrete’

(12) Blend errors (Kubozono 2001:38)

Input word A	Input B	Resultant Blend
a. <u>to.ma</u>|re ‘stop-IMP’	su.to|<u>-p.pu</u> ‘stop’	[toma|ppu]
b. <u>hi</u>|-i.taa ‘heater’	su|<u>to-o.bu</u> ‘stove’	[hi|toobu]
c. <u>ɕu</u>-|u.ji ‘penmanship’	ɕo|<u>do-o</u> ‘calligraphy’	[ɕu|doo]
d. *pe.ni*|-i| ‘penny’	|pe-n.|<u>su</u> ‘pence’	[peni|su]
e. <u>ba-</u>|i.ba-i ‘bye-bye’	a|<u>ku.syu</u>| ‘handshaking’	[ba|kuɕu]

Japanese speech errors, as argued by Kubozono, are produced by mora replacement or blending. The syllable, however, is seemingly irrelevant. In [ketɕap:u] ‘ketchup’, only the first two moras are metathesized, with the word mistakenly realised as [tɕakep.pu]. Note that the third mora [p], the first half of a geminate in the syllable /tɕap/, remains unaffected. The link between moras within a syllable is not respected; moras which are tautosyllabic behave independently with regards to speech errors. This is exemplified again in (11a) as the syllable of [dʑiN] in [arabudʑiN] is realised as [buN] in the incorrect form, with [dʑi] and [N] behaving independently.

Kubozono (1989) originally argued that this splitting of the two moras within a syllable is due to the lack of a rhyme constituent that mediates between the moras and the syllable. Kubozono proposes that moras are simply associated to the syllable, giving each mora independence. But if the syllable is a constituent to which moras are associated to, how is it possible that they can be altered at will? One would expect the integrity of a syllable to be respected if there is a relation to be maintained between the moras. Yoshida S. (1996) and Labrune (2012b) examine the data from Kubozono and argued that not only is the rhyme problematic, so is the syllable itself. I agree that speech error data shows that the moras are independent, but also that the syllable is irrelevant.

4.3.3 The bimoraic foot

Poser (1990) has proposed that there is a bimoraic foot in Japanese which guides certain word formation processes, but crucially he notes that this foot does not respect syllable boundaries. The bimoraic foot may bisect a syllable. Poser uses the bimoraic foot to account for hypocoristic formation (e.g. [osa-chan] from [osamu] 'P. name', [taro-chan] from [taro:] 'P. name'), mimetic reduplication words formed of two feet (e.g. [betabeta] 'sticky') and secret languages. Labrune (2012a,b) also examines loanword-clipping processes in which the bimoraic foot is used, with 80% of loanword clippings composed of a bimoraic foot, such as [demo] from [demonsutoreeɕoN] 'demonstration'. The foot does not count syllables, nor does it respect syllable boundaries.

A foot based on the syllable would make the wrong predictions for processes such as loanword truncation. Consider the truncation of [rimootokontorooru] to [rimokoN] 'remote control' (Labrune 2012a:153). Note that the second mora within the final product of truncation is [mo], not *[moo]. If the syllable were respected, the first word [rimooto] 'remote' would be truncated as *[rimoo]. A bisyllabic foot would furthermore give the surface form *[rimookonto], which is not evidenced. Labrune also gives a similar analysis for the truncation of [roriitakompurekkusu] 'Lolita complex' to [rorikoN] 'Lolita complex'. Again the syllable is not respected as the product of truncation is never *[roriikoN], nor *[roriikompu]. Both Poser and Labrune claim that if the foot does not respect syllable boundaries, it is likely that syllables are not relevant in Japanese.

4.3.4 Issues with genitive particle deaccentuation

Finally, there are issues with deaccentuation of words which are suffixed with the generative particle /no/. Exceptionality to this process creates doubt as to whether it truly provides stable evidence for the syllable. Lexical exceptions to pre-*no*-deaccentuation have been discussed in Vance (1987), Yoshida Y. (1999), Uwano (2003) and Labrune (2012a) among many others. Recall from 4.2.4 that Kubozono invokes syllabic adjacency to account for deletion of final accent on both light and heavy syllables in genitive case nouns. Exceptional words which meet the conditions for deaccentuation are problematic. Consider the following data from Yoshida Y. (1999).

(13) Exceptional words (Yoshida Y:1999:159-162)

a.	*	* (*)	
	[i ti]	[i ti no]	‘one’
b.	*	* (*)	
	[tsu gi]	[tsu gi no]	‘next’
c.	*	* (*)	
	[yo so]	[yo so no]	‘external entity’
d.	*	* (*)	
	[se n se e]	[se n se e no]	‘teacher’
e.	*	* (*)	
	[si ke N]	[si ke N no]	‘exam’
f.	*	* (*)	
	[sa to o]	[sa to o no]	‘sugar’

In the above data, it is expected that the accent on the genitive particle will trigger deaccentuation of the accent on the final syllable. Deaccentuation fails to apply to the above finally accented words for no clear reason, regardless of the final syllable being light or heavy. To account for the failure of deaccentuation, Yoshida Y. proposes that words are marked in the lexicon as to whether or not deaccentuation applies. However, the status of deaccentuation as a process of the grammar is unclear – a phonological process should be lacking in exceptions, or the exceptions should show a clear pattern. Pre-*no* deaccentuation is not solid evidence in favour of the syllable as a constituent, as the process which fails for no clear reason.[17] Labrune (2012a:159) further notes that it seems to be the case that deaccentuation only occurs in a small set of data, and that the majority of words do *not* undergo deaccentuation.[18] The process of deaccentuation, does not constitute a solid piece of evidence in support of the existence of the syllable if in fact the process is not clear and exceptionless. Let us conclude with a discussion of the accentuation of special moras found in certain contexts.

[17] To be specific, Yoshida Y. (1999) does not invoke the syllable for adjacency, but rather adjacency of nuclei at the nuclear projection. Yoshida analyses *no*-deaccentuation as accent clash resolution process, reminiscent of stress clash (Nespor & Vogel 1986). The clash is resolved by deletion of the word-final accent adjacent to the accent of the Genitive /-nó/.

[18] Labrune (2012a) further claims that words terminating in a heavy syllable which do undergo deaccentuation could be accented underlyingly on the final, degenerate mora. Under this view, accent is shifted to the preceding independent mora in the course of computation of lexical inputs. However, I note that this does not account for exceptions to deaccentuation of words with a final light syllable.

4.3.5 Accentuation of R, N and J

While it is generally accepted that the special moras are never accented word-medially, it is not true that the special moras R, N and J are never assigned an accent or realised with a high tone. Recall that R is the second half of a long vowel, N is the moraic nasal and J is the second half of a diphthong. Word-finally, these moras are found with a high tone in preceding certain pre-accenting particles, when unaccented words are realised without a suffix, and when unaccented words are pronounced with emphasis.

First, Higurashi (1983:35) points out that the particle /-ɕika/ 'only' has the effect of placing a high tone on the accentless noun to which it is suffixed. In all final syllables, including heavy syllables, accent is placed on the final mora even if it is a special mora. I recall the relevant data from Higurashi (1983:35) below.

(14) Accentless words with the suffix /-ɕika/ 'only'

a.	/mi ja ko/ [mi ja kó ɕi ka]	'capital' 'only the capital'
b.	/ko o e N/ [ko o e Ń ɕi ka]	'park 'only the park'
c.	/te k kʲo o/ [te k kʲo ó ɕi ka]	'iron bridge' 'only the iron bridge'
d.	/ko o ba N/ [ko o ba Ń ɕi ka]	'police box/ 'only the police box'
e.	/ɕi a i/ [ɕi a í ɕi ka]	'match/game' 'only the match/game'

What is peculiar and unexpected here is that if the second mora within a syllable cannot receive an accent, it should not exhibit accent under any condition. However, the particle /ɕika/ 'only' is inducing just such an effect. Other pre-accenting particles such as /ke/ 'family of' do not exhibit this behaviour, however. This can be seen in the alternation [káto:] 'Katō, family name' and pre-accented [kató:ke] 'The Katō family' (Kawahara 2015:455). While I do not provide a full analysis of these two types of pre-accenting particles here, I claim that any theory of Japanese accentuation must still account for the fact that the special moras are indeed bearers of an accent in the above data.[19] The claim that the second mora within a syllable cannot bear an accent is not

[19] I deal with pre-accenting particles in Chapter 6, briefly proposing that the difference between the two is the way in which the morphemes are treated with regards to phonology.

upheld, and perhaps the syllable is not necessary to account for the generalisation that domain-medial special moras are not bearers of a lexical accent.

In isolation, unaccented words are realised with a final accent, with realisation of high tone found on the final mora. This occurs whether the final syllable is light or heavy and produces forms with accent on a special mora. This is shown in the following data, drawn from Yoshida Y. (1999) and NHK (2012).

(15) Unaccented words containing no special moras (Yoshida Y. 1999)

a. [ha ɕí] 'edge'

b. [ha ná] 'nose'

c. [sa ku rá] 'cherry tree'

d. [ku ru má] 'car'

(16) Unaccented words with a final special mora (Yoshida Y. 1999)

a. [o Ń] 'sound'

b. [u do Ń] 'udon noodles'

c. [o N i Ń] 'phoneme'

d. [gi N ko ó] 'bank'

(17) Further examples of unaccented words drawn from NHK (2012)

a. [a i ji i Ń] 'lover'

b. [ka tsu bo ó] 'longing'

c. [ga N ta í] 'eyepatch'

d. [o su í] 'sewage

f. [ha tsu ko í] 'first love'

In a syllable-based account of Japanese accent, the final high tone found on the above data cannot be account for without admitting the possibility of accentuation on a final special mora.

Indeed this accentuation holds in some circumstances even when suffixation occurs; Vance (1987:81), citing facts pointed out by Shoko Hamano (p.c.), claims that a fall in tone is witnessed between unaccented words terminating in a special mora and the quotative particle /to/ in emphatic speech. He provides the form [koobaŃ to it:a] 'I said POLICE BOX'. While Vance does note that the noted emphatic pronunciation is likely an effect of intonation, I assume that the fall in tone following the special mora, and not the preceding vowel, is an effect of the final accent on the special mora as in surface forms discussed above. Labrune (2012a:157), citing Hamano (1998:32) also points out that mimetic words may also show accent on a special mora, as in [piNpiŃto] 'mimetic adverb'.

While the above cases of accentuation on special moras are not discussed thoroughly in the literature regarding the status of the syllable, they must be considered in any account of Japanese phonology. If the syllable is needed to account for non-accentuation of special moras word-internally, it is strange that the status of special moras as unaccentable is ignored word-finally. The bisecting of a well-formed syllable in speech errors and foot formation is also problematic. With regards to dialects besides Tokyo Japanese, the effect of the syllable in defining unaccentable positions is absent when one considers dialects which accent special moras word internally, as with Kansai Japanese words such as [o Ń na] 'woman', discussed in Chapter 1. If the effects of the syllable are partially ignored domain-finally in Tokyo Japanese and both domain-finally and domain-medially in Kansai Japanese, could it be possible that the syllable is not the answer? I now turn to alternative consideration of Japanese accentuation, in which the syllable as a constituent is rejected, and the structure of the special moras themselves is the cause for their unaccentability in Tokyo Japanese.

4.3.6 Questioning the syllable

The above facts are problematic for any account assuming the syllable as a unit which organises the moras of Japanese. Indeed, the above facts are problematic also for an account utilising a branching rhyme or branching nuclear constituent to represent long vowels and diphthongs (Yoshida S. 1996). It is possible that the syllable does *not* have relevance to accent assignment and is absent, proposed by both Yoshida Y. (1999) and Labrune (2012a,b). I agree on this point and I argue in the remainder of this thesis that the syllable is unnecessary to capture the accent assignment patterns of Japanese.

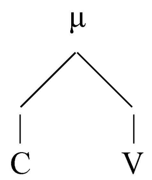
4.4 Towards a syllable-free approach to Japanese phonology

I now discuss one recent model of Japanese phonological structure which eschews the use of the syllable and attempt to account for Japanese accent shift and the restricted ‘syllable’ of Japanese without the use of a syllable constituent. In the remainder of this chapter I discuss a recent proposal from Labrune (2012a,b), who utilises only the mora and the bimoraic foot to account for accent assignment in Japanese.

4.4.1 The mora as the only constituent

Labrune (2012a,b) rejects any use of the syllable and proposes that Japanese words are composed of only moras and feet. Special moras are presented as structurally deficient moras, lacking in certain segmental or featural content. Labrune also utilises an additional sonority-based mora hierarchy and two Optimality Theory based constraints to account for the markedness of accent on special moras. In her proposal, Labrune (2012:134-139) suggests that Japanese ‘syllables’ are defined as a set of prosodemes, which consist of a mora to which a C and V position are attached, as in the CV mora shown in (15).

(18) Full and independent CV mora



Labrune then proposes an expanded set of special moras, or deficient moras. The set of deficient moras is expanded from moras lacking an initial vowel, /N/, /Q/ and /R/ to include devoiced vowels and epenthetic vowels, which also show dispreference for accent assignment. This set consists of the following moras below.

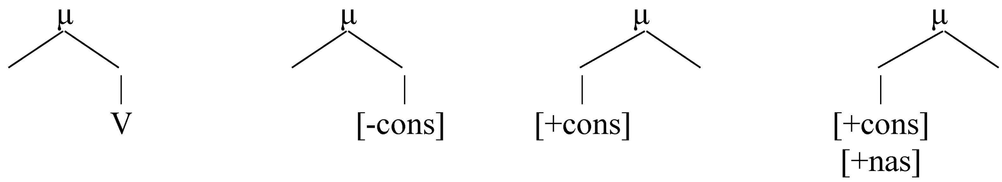
(19) Deficient moras (Labrune 2012b:135)

a. Prosodemes containing only one nuclear vowel
b. Prosodemes containing /N, Q, R/
c. Prosodemes containing a devoiced vowel
d. Prosodemes containing an epenthetic vowel

Deficient moras are concretely understood to be prosodemes lacking a full CV structure. (16a) refers to a mora which is onsetless, as in [kanga**e**ru] ‘to think’ or those found in a diphthong, though no conditions on diphthong-hood are considered by Labrune. She also considers the prosodemes /R/, /Q/ and /N/ to be deficient both structurally and featurally. These moras are represented below, with the deficient moras having an underspecified feature specification, gaining full feature specifications from neighbouring prosodemes.

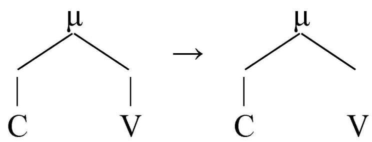
(20) Deficient Prosodeme Representation

/V/ /R/ /Q/ /N/

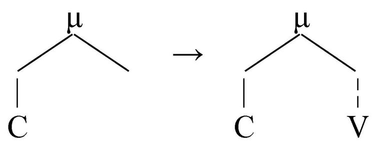


Devoiced vowels are represented as a delinked V position and epenthetic vowels are represented as a mora with no V attached underlyingly. I do not discuss the behaviour of devoiced and epenthetic vowels in depth, but see Kubozono (2008), Labrune (2012a,b) and Kawahara (2015) for details of their aberrant behaviour with relation to accent assignment. The representation of these prosodemes is shown below.

(21) Devoiced vowel e.g. [futsuka] > [futska] ‘two days’

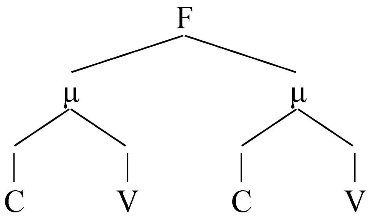


(22) Epenthetic vowel as in loanwords e.g. ‘Spain’ > [s**u**peiN]



As for prosodic structure above the mora, Labrune proposes that a foot is built of two moras as in (23), following the proposal of Poser (1990). Without the syllable, the construction of the foot is straightforward, and the bisection of a syllable as discussed above is not problematic as the syllable constituent is absent.

(23) A foot composed of two moras



Labrune thus unifies degenerate moras through their structure, with all of the above deficient moras lacking a full C and V position. To fully account for the dispreference of accent on a deficient mora, Labrune (2012a,b) then proposes a constraint-based analysis in Optimality Theory (Prince & Smolensky 2002) and a mora hierarchy. I do not provide an introduction to OT, but in simple terms, various input forms are generated and evaluated by the ranked constraints of a grammar, and the input that violates the fewest high-ranking constraints is the chosen output.

In Labrune's account, accent shift is accounted for first by referring to the new constraint [NADM], or 'Non-Accentuation of Deficient Moras'. Labrune proposes that for Standard Japanese, the constraint NADM dominates the constraints Max(ACCENT) and FaithIO(ACCENT). Max(ACCENT) is satisfied if an input accent is present in the output, while FaithIO(ACCENT) is satisfied if the input accent is retained in the *same position* in the output.

Consider the constraint ranking and sample tableau provided by Labrune (2012a:168-169) below. Accented moras in the following data are bolded. Within an OT tableau, inputs that incur violations are marked with an asterisk, with a fatal violation given an exclamation point. The optimal output is highlighted with a finger pointer.

(24) OT Constraint Hierarchy and Tableau evaluating /hoN/ 'book'

a. Constraint hierarchy: NADM >> Max(ACCENT) >>FaithIO(Accent)

b. Tableau

/ho**Ń**/	NADM	Max(ACCENT)	FaithIO(Accent)
☞a. **hó**N			*
b. ho**Ń**	*!		
c. hoN		*!	*

Labrune (2012a) first notes that the finally accented candidate /hoŃ/ violates the highest ranked constraint NADM, thus making this input candidate the least optimal input candidate.[20] Of the two remaining candidates, accentless /hoN/ is rejected as this possible output deletes the input accent, violating both Max(ACCENT) and FaithIO(ACCENT). As the input form /**hó**N/ only violates one constraint, the low-ranked FaithIO(ACCENT), it is the optimal candidate and is chosen as the output form by the grammar. Labrune accounts for further foot-based phenomenon and the lack of accentuation of special moras in loanwords by assuming first that only the head of a trochaic foot receives an accent and second by proposing the constraint *F[*m*, which bans a degenerate mora from being the head of a foot. For further discussion, see Labrune (2012a:205ff). Crucially, the constraints need not refer to the syllable.

Ranking of constraints is argued by Labrune to vary among Japanese dialects. Consider first the fact that the Izu dialect of Japanese permits accentuation of deficient moras as in the word [kaí] 'shell', which is accented on the second half of a diphthong and which contrasts with [kái] 'paddle' (Labrune 2012a:169, citing Uwano 2003). The difference between Standard Japanese and Izu Japanese from a constraint point of view is that in Izu Japanese, NADM is ranked below FaithIO(ACCENT).

Labrune also attempts to account for the words that are found with accent on deficient moras, however marginal these forms might be. This consists of forms such as the complex words [kooe**Ń-**ɕika] 'park-only' and [tekkjo**ó-**ɕika] 'iron bridge-only' (Labrune 2012a:157), with /-ɕika/ 'only' analysed as a particle which gives the preceding noun final accent, even on a deficient mora.[21] While no constraint is proposed to account for the possibility of accent on /N/ or /R/ and other deficient moras while preventing accent on /Q/, Labrune (2012a) proposes a mora hierarchy to provide some explanation. I present the hierarchy below. Preferred moras are present to the left end of the scale.

(25) Mora hierarchy for Japanese (Labrune 2012b:141)

a. CV > .V > C.

b. Ca > Co, Ce > Cu, Ci > .a > .o, .e > { .i, .u,
CV [devoiced]
CV [epenthetic] }> R > N > Q

[20] Labrune (2012a) proposes that certain words are underlyingly accented on a special mora but that constraints prevent this accented special mora from surfacing as accented. An underlying final accent is possibly motivated by pre-*no* deaccentuation.

[21] In Chapter 6, I propose an alternative analysis for the particle /-ɕika/.

Labrune (2012a:169) places the 'most sonorous and stable' moras at the top end of the hierarchy, with other moras listed in increasing unacceptability. The special moras /R/, /N/, and /Q/ are found at the bottom, due to the dispreference for accent on these moras. The hierarchy is determined by the preference for accent and by sonority and stability. While this approach is novel, there is no further justification beyond the stipulation of the above hierarchy why the deficient mora /Q/ does not receive an accent and why onsetless moras as a whole are dispreferred, though avoidance of devoiced vowels can account for the low ranking of moras with the vowels /i/ or /u/. Due to the low placement of N and R on the hierarchy, and **.i** for the special mora J, accent is dispreferred but indeed possible, assuming that the hierarchy affects even marginal accentuation. However, it is unclear how this hierarchy is integrated into the analysis of accent assignment as a whole, and Labrune (2012a,b) provides no full analysis of marginal accentuation on special moras. The constraint based account goes some length to account for why the moras R, N, J and Q cannot receive a theoretical explanation without referring to the syllable, but it leaves the possibility of accentuation on these moras unclear.

4.4.2 Considering structure in further detail

I propose that focus should be put upon the phonological facts relating to deficient moras. The proposal regarding deficient moras is a strong one and highlights the question: is there truly a structural reason why certain moras are dispreferred? Why is a geminate never a good location for accent? Why are R, N and J possible locations for an accent, even marginally? What makes onsetless moras marked as accent sites? It is clear that there is a unifying reason for degenerate moras to be dispreferred. Dispreferred positions are clearly not fully formed, they are not independent and are often lacking in structure or featural content. What is lacking, however, is a direct link from the structure of a deficient mora to its inability to support an accent. The makeup of 'deficient moras' must be examined more closely before appealing to a constraint such as NADM and a hierarchy based on sonority.

4.5 An interim roadmap

I propose that a GP analysis of Japanese syllable structure can account for the accent patterns found in Japanese. The failure of special moras to receive an accent is accounted for through the use of a unified cause: non-projection of the tone bearing unit. I propose that accentuation of special moras is possible in final position due to the projection of a final nucleus, or V position. No mora hierarchy or constraint ranking is necessary, nor any reference to a syllable constituent.

In chapter 5 and 6, I review proposals from Yoshida Y. (1999) and Yoshida S. (1996, 2003) couched within Government Phonology (Kaye, Lowenstamm & Vergnaud 1990). I consider the accentuation of both morphologically simplex and complex words with light and heavy syllables. In Standard GP, the non-accentuation of N and Q is accounted for by proposing the existence of an a empty nucleus found in the structures of a nasal-obstruent cluster and geminate clusters. Non-accentuation of the moras R and J is caused by the formation of a surface branching nucleus. I reject these analyses in chapter 6 on formal grounds.

In the remainder of the thesis, I argue that a Strict CV (Lowenstamm 1996, Scheer 2004) revision of the relevant structures can account for both common and marginal accentuation facts. The latter half of Chapter 6 introduces a Strict CV analysis of word structure. I define a tone-bearing unit as a projected nucleus or V position, following the spirit of Yoshida Y. (1999). I first deal with independent moras and the special mora Q. The special mora Q is unaccentable as it is formed of two onsets straddling an empty nuclear position which does not project, roughly retaining the analysis of Q from Yoshida S. (1996). I present preliminary representations of R and J as dependent nuclear structures. In a new proposal, I do not assume that the moraic nasal N is a consonant and I claim that it is in fact phonologically a vowel, in contrast to proposals found in the literature (Labrune 2012a, Vance 2008, McCawley 1968 and many others).

In Chapter 7, I discuss long vowels, diphthongs and hiatus. I define the special moras R and J as licensed and governed nuclei respectively, with long vowels and diphthongs formed of two nuclei. A hiatus is also formed of two nuclei, but they are independent. In a long vowel or diphthong, the second nucleus fails to project. I propose a new theory of diphthong formation within Strict CV to account for the behaviour of the diphthongs /ai, oi, ui/, as opposed to hiatus sequences such as /au/, /oa/ and /oe/. The new proposal for diphthongs is also used to account for Owari vowel coalescence, discussed previously in Chapter 3.

Chapter 8 examines the patterns of high tone spreading found in Tokyo and Owari Japanese, discussed earlier in chapter 1. In the literature, two patterns of tone spreading are attested, one that is weight insensitive and one that is possibly weight sensitive (cf. Haraguchi 1977, Tanaka 2013). At first glance, high tone spreading affects the initial mora only if it is part of a heavy syllable. I show that this is incorrect, and that CVQ syllables do not undergo high tone spreading while CVN syllables pattern with CVJ and CVR syllables. In order to account for these facts and others, I consider my proposal regarding the special mora N, and I show that a vowel-N sequence analysed as a nasal vowel is supported by the facts of Tokyo and Owari Japanese tone spreading.

I conclude in Chapter 9 by summarising the proposals and considering the role of special moras in Tokyo, Kansai and Kagoshima Japanese. Recall that Tokyo Japanese is considered a mora-counting syllable dialect of Japanese, while Kansai Japanese is a mora-counting mora dialect and Kagoshima Japanese is a syllable counting, syllable dialect. Without referring to the syllable, I apply a proposal from Scheer & Szigetvári (2005), in which the projection of nuclear positions is parameterised domain-medially and domain-finally. I propose that these dialects do not differ in their counting of syllables or moras, but rather that the dialects differ in the projection possibilities afforded to governed/licensed positions, with parameter settings accounting for the evidenced variation. Finally, I consider future avenues for research.

Let us now examine the Standard Government Phonology proposals from Yoshida S. (1996) and Yoshida Y. (1999) before continuing on to a syllable-free and branching constituent-free model of Japanese.

Chapter 5: Government Phonology and Japanese

Let us now consider an alternative proposal put forth by Yoshida Y. (1999) in which a Japanese syllable is composed only of an Onset-Nucleus pair. Yoshida Y.'s proposal is couched within Government Phonology (Kaye, Lowenstamm & Vergnaud 1990), or GP. This builds on previous work by Yoshida S. (1990, 1996) who presented a first analysis of Japanese segments and syllable structure within Government phonology. Yoshida Y. (1999) proposes that the unit of accent assignment is the nucleus. No reference is made to the syllable or the mora, with accent patterns accounted for solely through consideration of the licensing relations present within a word. Further work within GP or Element Theory includes Yoshida Y. (2006), Yoshida Y. & Zanma (2002), Nasukawa (2005, 2010, 2015), Nasukawa & Backley (2011) and Backley & Nasukawa (2013, 2016).

The representations pursued within a GP analysis of Japanese do not utilise the mora or the syllable constituent. Accent is accounted for by referencing only the nucleus, the relations of licensing, and government which contracts between nuclei, was well as the resultant ability (or inability) to project and serve as a suitable site for accent. Yoshida Y. argues that a GP-based proposal can account for the accent patterns found in Standard Japanese in an explanatory manner, while avoiding the pitfalls of the syllable.[1] I point out that this account does not stipulate any new constraints or hierarchies unique to Japanese, and representations provide a suitable account for processes of accent shift. Yoshida Y. defines a suitable or unsuitable accent site by considering the relevant nucleus and the forces of licensing and government.

Below, I first briefly introduce Yoshida Y.'s representation of a 'syllable' as an onset-nucleus pair and examine the definition of a well-formed word within Government Phonology (GP) and licensing in 5.2. In 5.3, I consider the definition of pitch accent and the formal nature of what Tokyo Japanese pitch accent is. I then examine in 5.4 the accent assignment facts and the structure and formal assignment of accent in native Yamato words are composed of words with no 'special moras'. Section 5.5 examines pitch accent assignment in morphologically complex domains, concentrating on patterns found in Yamato nouns. In Chapter 6, I turn to the behaviour

[1] The accent system of Tokyo Japanese is the same as Standard Japanese described by Yoshida Y. (1999). I use the term Tokyo Japanese interchangeably with Standard Japanese depending on the source reference. For more on the evolution of Standard Japanese and the variety spoken in Tokyo, see Shibata (1998), Carroll (2001) and Frellesvig (2010).

of ‘special moras’ found in long vowels, diphthongs, geminates and ‘moraic’ nasals. I pay particular attention to the accent patterns of these words, revisiting and revising the proposed derivation of accent assignment seen in this chapter. Let us now begin the examination of the Japanese syllable structure using only the onset and nucleus.

5.1 The Japanese syllable as an onset-nucleus pair

In her analysis of Japanese pitch accent assignment in morphologically simplex and complex words, Yoshida Y. (1999) proposes that Japanese words are formed solely of non-branching onset-nuclei pairs. The analysis is framed within GP, which aims to account for all phonological structure utilising universal principles and parameters.

Yoshida Y. (1999) rejects not only the syllable constituent and the mora, but also branching nuclei (for long vowels and diphthongs) and branching rhymes (for the syllabic nasal and geminate). Partial non-branching analysis of Japanese is found in Yoshida S. (1996) and full use of non-branching representations following Yoshida Y. is found in Nasukawa (1997, 2005). A non-branching account of coda-onset clusters and long vowels or diphthongs is also pursued in work in languages such as Turkish (Charette 2000, 2004, 2008), Bemba (Kula 1999, 2006; Kula & Marten 1998), Polish (Gussmann & Kaye 1993, Gussmann 2007, Cyran 2010) and Korean (Heo 1995, Kim 1996, Rhee 2002) among others. More recent work since Lowenstamm (1996) has focused on the CV hypothesis, where languages have branching constituents and all languages compose words of strictly repeating C and V positions. See also Scheer (2004, 2012) as well as the following chapter for further discussion of this framework.

By rejecting the mora, Yoshida Y. proposes that the nucleus is the site of pitch accent assignment. Consider the representation of the word [sakura] ‘cherry tree’ below.

(1) Representation of [sakura] ‘cherry tree’

O_1	R_1	O_2	R_2	O_3	R_3
|	|	|	|	|	|
|	N_1	|	N_2	|	N_3
|	|	|	|	|	|
x	x	x	x	x	x
|	|	|	|	|	|
s	a	k	u	r	a

Let us consider Yoshida Y’s basic argument against the syllable constituent or branching constituents, where she examines the high pitch of initial ‘syllables’. What

Yoshida Y. terms high pitch spreading has already been discussed in Chapter 1 as the spreading of H, or high tone. Consider the surface pitch patterns below, which I have termed Tokyo Pattern A in chapter 1. Other patterns of pitch spread noted in Haraguchi (1977) are discussed in chapter 8.

(2) Unaccented words, with pitch spread until the initial nucleus (Yoshida Y. 1999)

a. sa $\overline{\text{ku ra}}$ ‘cherry tree’

b. ko $\overline{\text{o ri}}$ ‘ice’

c. bjo $\overline{\text{o ki}}$ ‘illness, sick’

d. ka $\overline{\text{i te}}$ ‘buyer’

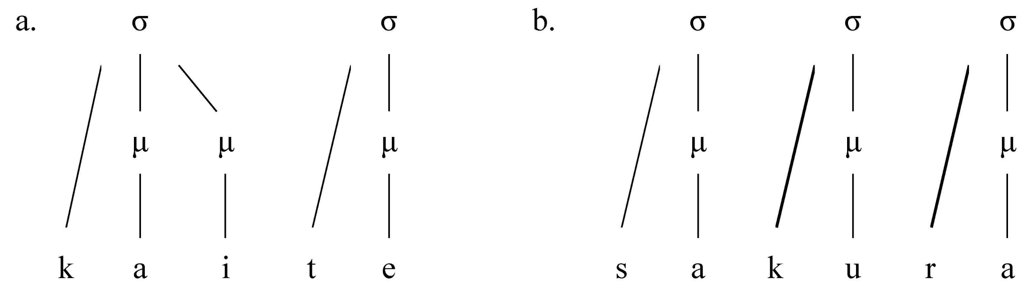
e. to $\overline{\text{i si}}$ ‘whetstone

f. ba $\overline{\text{t ta}}$ ‘grasshopper

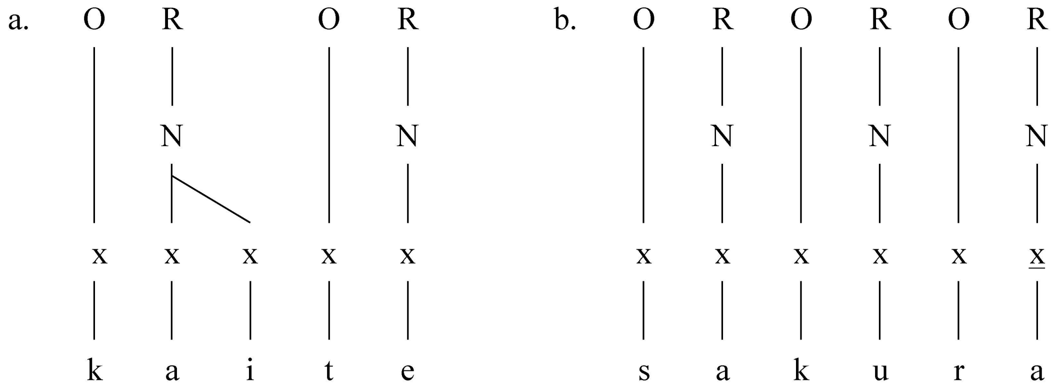
g. ke $\overline{\text{ŋ ka}}$ ‘quarrel’

As we have discussed in the previous chapter, the pitch spreading pattern found in the above diphthongs, long vowels, geminates or moraic nasals are problematic for the mora-and-syllable analysis. Under the traditional analysis, a syllable unifies the initial nucleus and the following ‘special mora’ in words such as [kaite] ‘buyer’ [koori] ‘ice’ [bat:a] ‘grasshopper’ and [keŋka] ‘quarrel’. Each mora within the initial syllable in these words would be expected to have the same pitch pattern, yet the initial mora behaves independently. It does not receive high pitch in the above data. This pattern is also problematic for any account that assumes a branching rhyme or nucleus. Branching constituents also predict that segments associated to the same rhyme or nucleus constituent should bear the same pitch pattern. Indeed, the same issue is salient in words where the two vowels within an accented syllable do not both receive a high tone or accent, as in [káìsùì] ‘sea water’ or [kàíté] ‘buyer’. The representation of [kaite] ‘buyer’ using the syllable-and-mora is shown below in (3), and in (4). I provide an example structure using the branching nucleus as in earlier Government Phonology work (Kaye, Lowenstamm & Vergnaud 1985). Both structures are unable to provide independence for the first and second mora and are also a problematic issue for processes of blending, truncation and other word formation or alteration processes, discussed previously.

(3) Syllable-and-mora representation of [kaite] ‘buyer’ and [sakura] ‘cherry tree’[2]



(4) Representation using the onset and rhyme with a branching nucleus



Yoshida Y. argues that if the pitch-bearing unit is defined as the nucleus and a non-branching account of Japanese is proposed, the high pitch spreading patterns seen above are *not* problematic. First, let us assume that the initial and second ‘mora’ are not organised into a syllable. Second, one must also discard the notion of a branching rhyme or nucleus, as the usage of such constituents mistakenly predicts the unified behaviour of pitch spreading for the first vowel and second vowel in the word [kaite] ‘buyer’.

Yoshida Y. proposes that each word is composed of strictly repeating Onset-Rhyme pairs, or rather Onset-Nucleus pairs. In this proposal, long vowels and diphthongs are composed of two nuclear positions, while geminate and nasal-obstruent clusters are composed of two onsets flanking an empty nucleus. The nucleus present apparently accounts for the fact that both the initial portion of a geminate consonant and the nasal in a nasal-obstruent sequence are perceived as bearing a high pitch.[3] The heterosyllabic behaviour of the initial vowel and the following segment, whether it is a

[2] Accent assignment for the syllable-and-mora representation could operate on the syllable level while tone or pitch spreading operates purely on the level of the mora, but this does not explain the pattern of heavy syllable sensitive tone spreading, discussed briefly in Chapter 1 and discussed further in Chapter 8.
[3] I compare this pattern and discuss it critically in chapter 8, in comparison to Pattern B.

vowel or a consonant, are accounted for due to the lack of a syllable or branching constituent to unify the initial nucleus which does not receive a high pitch and the following high pitched onset-nucleus pair.

Consider the below representations, using only the onset-nucleus pair. Following Yoshida Y. (1999), I do not show the rhyme in the remaining representations below as it does not branch.

(5) Representation of a CVCVCV word as in [kurum a] 'car'

```
O1   N1   O2   N2   O3   N3
|    |    |    |    |    |
x    x    x    x    x    x
|    |    |    |    |    |
k    u    r    u    m    a
```

(6) The representation of syllables with 'special moras' (to be revised)

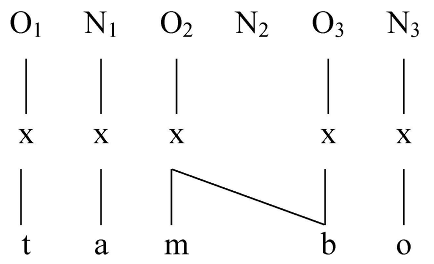
a. Long vowel as in [ko:ri] 'ice'

```
O1   N1   O2   N2   O3   N3
|    |         |    |    |
x    x         x    x    x
|     \       /
k        o          r    i
```

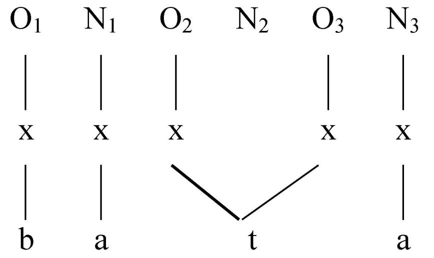
b. Diphthong as in [kaigi] 'meeting'

```
O1   N1   O2   N2   O3   N3
|    |         |    |    |
x    x         x    x    x
|    |         |    |    |
k    a         i    g    i
```

c. Nasal-obstruent cluster as in [tambo] 'paddyfield'



d. Geminate as in [bat:a] ‘grasshopper’



I delay discussion of the renewed representation for ‘special moras’ until the following chapter, but note that each word may support high pitch on the second nucleus present in each representation, as exhibited in the earlier pitch spreading data. Note that the empty onset or nucleus positions shown above are relevant to the unaccentable character of ‘special moras’. Let us now turn to the basic principles of GP in order to discuss a new approach for accent assignment, considering first only words with simple onset-nucleus pairs.

5.2 GP and the nucleus as the site of accent assignment

In this section I introduce the principles of GP (Kaye, Lowenstamm & Vergnaud 1990) relevant for our discussion of Japanese. Yoshida Y. utilises licensing and governing relations between nuclei proposed by the theory to account for pitch accent patterns. Broadly construed, licensing is a force holding between constituents which permits the association and phonetic realisation of a segment and government allows empty positions to remain unexpressed phonetically.[4] In a word with derived accent, Yoshida Y. ties the location of accent directly to the licensing relations constructed within a simplex or complex domain, or word.

I begin by considering the definition of a well-formed word within GP. Kaye (1990a) has proposed the Licensing Principle. The principle is reproduced in its entirety in (7).

[4] For discussion of licensing within other frameworks, see work in Dependency Phonology (Anderson & Ewen 1987) or Prosodic Phonology (Itō 1987, Goldsmith 1990).

four nuclei in [murasaki] ‘violet’ license their onsets, but the nuclei themselves remain unlicensed at that level. To satisfy the LP and for a word to be well-formed, these nuclei contract licensing relations with each other. This view is followed in Standard GP work such as Charette (1991) on French and Harris (1994) on English. In the analysis presented by Yoshida Y. (1999), all unlicensed nuclei seek a licensor and project to the first Nuclear Projection (NP1). These projected nuclei then contract head-final licensing relations starting from the right edge of the domain. This is shown below in (9).

(9) Internuclear licensing at the first nuclear projection in [murásaki] ‘violet’

$$\begin{array}{ccccccccc}
 & N_1' & \leftarrow & N_2' & & N_3' & \leftarrow & N_4' & \text{NP1}\\
 & | & & | & & | & & | & \\
O_1 & N_1 & O_2 & N_2 & O_3 & N_3 & O_4 & N^4 & \\
| & | & | & | & | & | & | & | & \\
x & x & x & x & x & x & x & x & \\
| & | & | & | & | & | & | & | & \\
\text{m} & \text{u} & \text{r} & \text{á} & \text{s} & \text{a} & \text{k} & \text{i} &
\end{array}$$

The unlicensed nuclei at NP1, N_2 and N_4, project once again to the second nuclear projection (NP2) as they both remain unlicensed. Yoshida Y. proposes that these projected nuclei then contract head-initial licensing relations, as shown below in (10).

(10) Licensing relations at the second nuclear projection in [murásaki] ‘violet’

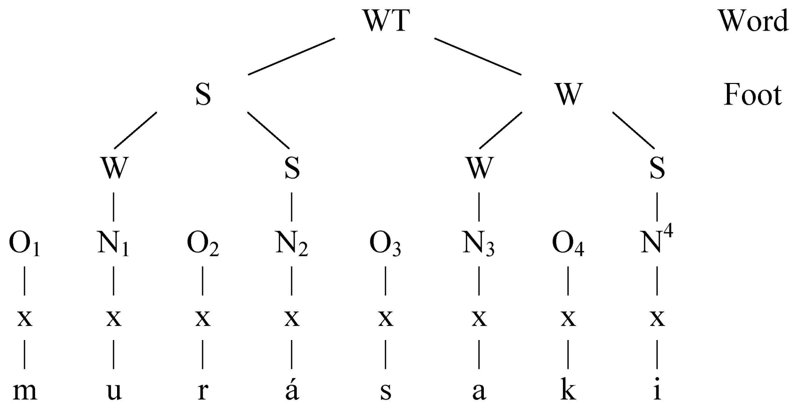
$$\begin{array}{ccccccccc}
 & & & N_2'' & \rightarrow & \rightarrow & \rightarrow & N_4'' & \text{NP2}\\
 & & & | & & & & | & \\
 & N_1' & \leftarrow & N_2' & & N_3' & \leftarrow & N_4' & \text{NP1}\\
 & | & & | & & | & & | & \\
O_1 & N_1 & O_2 & N_2 & O_3 & N_3 & O_4 & N^4 & \\
| & | & | & | & | & | & | & | & \\
x & x & x & x & x & x & x & x & \\
| & | & | & | & | & | & | & | & \\
\text{m} & \text{u} & \text{r} & \text{á} & \text{s} & \text{a} & \text{k} & \text{i} &
\end{array}$$

The projection of N_2 is now the sole unlicensed nucleus, and is the head of the domain. This nucleus is thus site of accent assignment for the word [murásaki] ‘violet’. Yoshida Y. proposes that it is the above process of licensing which accounts for accent assignment patterns, which I discuss in more detail in 5.4.[5]

[5] Licensing relations in words with fewer nuclei as well as compound nouns and suffixed nouns are discussed in 4.2.3.

Yoshida Y. further claims that the licensing relation at NP1 is roughly equivalent to the metrical foot utilised in other approaches. An alternate representation of [murásaki] 'violet' utilising the metrical foot is shown below.

(11) Representation of [murasaki] 'violet' utilising the foot (Yoshida Y. 1999:79)



The above representation fully translates the projections of nuclei into a metrical foot structure. WT stands for Word Tree, while S typically represents the strong member of a foot and W the weak member, common in work on metrics since at least Liberman & Prince (1977) and Halle & Vergnaud (1978). The metrical foot is treated by Yoshida Y. as analogous to a pair of projected nuclei in a licensing relation; the foot as a constituent does not exist in the GP framework but is used here as a convenient label. Assuming these labels as shorthand for nuclei and their projections, each nucleus marked <S> is the licensor of nucleus marked <W> as shown previously. The moras forming a 'foot' are two nuclei in a licensing relation at NP1 and the head of the foot is the licensor projected to NP2 as shown above. I note that once translated, the binuclear 'foot' of Yoshida Y. (1999) is roughly equivalent to the bimoraic foot proposed by Poser (1990) and Labrune (2012a).

However, the foot as shown above differs from previous proposals in building feet from the right edge with no possibility provided for extrametricality as used in proposals following Hayes (1995). Both Kubozono (2008) and Labrune (2012a) utilise extrametricality of the final syllable or mora respectively for foot-building to derive default antepenultimate accent, derived from assignment on the final left-headed foot. Poser (1990) builds right-headed bimoraic feet from the right edge and claims that the final foot is invisible to accent assignment.

Yoshida Y's approach makes no reference to extrametricality and derives antepenultimate accent from the use of two right-headed feet. Yoshida Y.'s proposal also accounts for the default and unmarked nature of unaccented patterns in words of three nuclei or less, discussed below. Let us now consider what 'pitch accent' should be defined as with regards to tone and stress.

5.3 Defining pitch accent in Standard GP

Yoshida Y. (1999) aims to unify pitch accent languages with stress languages and proposes that licensing structure is key to deriving the accent patterns of words with both light and heavy syllables. I focus here only on Yoshida Y's discussion of Japanese, though the source also discusses pitch accent in Serbo-Croatian and parallels with English in further detail. In Yoshida Y.'s proposal, a pitch accent is assigned in the same manner as stress, and furthermore an account assuming that pitch accent is similar to tone is not accepted. No high or low tones are proposed in the approach taken by Yoshida Y. This is in contrast to other approaches, which assume the insertion of Low and High tones, such as Haraguchi (1977) and Kawahara (2015).

Yoshida Y. first proposes that a pitch accent is the manifestation of accent on a head nucleus within a word, with a high pitch or F0 at the site of an accent as the phonetic interpretation of an accent.[6] Accent is assigned in the same manner as stress through licensing structure. No high tone is assigned. This is summarised in the Pitch Accent Principle below.

(12) **Pitch Accent Principle** (Yoshida Y. 1999:69)

A pitch accent language has only one tone (pitch), high pitch, which is the immediate interpretation of a pitch accent.

The head of the domain may be lexically specified, as in accented words, or absent in the lexicon and derived, as in unaccented words. In so-called unaccented words, word-final accent is assigned by the phonology. From this viewpoint, the only difference between pitch accent in Japanese and stress in English is the phonetic duration of the head nucleus within a domain. I disagree with this position and argue shortly that while licensing structure is indeed used to derive the surface pitch of Japanese, a privative tone analysis is superior.

[6] This is in contrast to stress in English, which is interpreted phonetically as a rise in F0 as well as an increase in duration. This increase in duration in languages like Italian or English is of course considered to be phonological; see Scheer (2004) and Ulfsbjorninn (2015) for recent discussion of stress in GP and Kager (2007), Apoussidou (2010) and Hermans (2011) for recent general reviews.

5.3.1 Against Low tone

The existence of a Low tone is explicitly rejected by Yoshida Y. (1999), though the use of a Low tone is used in work by Haraguchi (1977) and Kawahara (2015). A fall in pitch is found on the nucleus following a word-medial accented nucleus as well as a word initial nucleus if this nucleus is not itself accented. This phonetic low pitch is argued by Yoshida Y. to be caused not due to placement of a low tone, but due to the lack of accent on a nucleus.

The absence of Low or L is argued for due to the absence of any word in which a Low tone is active or marked, such as accent assignment, accented particles, tone spreading and the like, and L is never found in the head position of a domain or in a contour tone. No contrast in Standard Japanese is found between a low-tone accented word and a high-tone accented word, as found in a true tonal language such as Mandarin Chinese.[7] In simple terms, a low F0 realised on a nucleus is the pitch interpretation of a nucleus with no accent.

Recently, Backley & Nasukawa (2013) have claimed that Japanese should be understood as a language which underlyingly specifies only L tone. No H tone is encoded. It is unclear how this approach would deal with high pitch or high tone spreading, however. Without using H, one cannot explain those words where an entire word exhibits high tone for heavy-syllable initial Tokyo Pattern B and Owari Japanese words (as discussed in Chapters 1 and 8). In addition, this does not explain why single-mora words will be produced with high pitch rather than low pitch. I therefore reject this analysis.

In addition, Yoshida Y. also claims that pitch accent should not be understood as tonal as only one block of high pitched nuclei are ever found within a word. This block consists of the accented nucleus, interpreted as high pitched, and preceding nuclei. If Standard Japanese were a true tonal language, Yoshida Y. claims that one would expect more than one high tone block within a phonological domain (Yoshida Y. 1999:69-73). We never find such a pattern in either morphologically simplex or complex words, unlike tonal languages. See Yoshida Y. (1999:72-73) for further discussion of this point with relation also to Serbo-Croatian.

[7] Such a position is not as clear for other dialects of Japanese such as Kansai Japanese, however. See Haraguchi (1977) for data and description of dialects with possible contour tone and Hirayama (1960), Frellesvig (2000) and Haraguchi (2001) for further data and discussion of the Kansai Japanese facts.

5.3.2 High pitch/tone spreading in Japanese

With regards to high tone spreading or high pitch spreading, Yoshida Y. claims that this process is not the spread of a High tone or H. She proposes that the high pitch of an accented position is simply phonetically interpreted on the nuclei preceding the accent site within a phrase, be it morphologically simplex or complex.

High pitch spreading operates from the site of a lexical or derived accent until and excluding the initial nucleus. Yoshida Y. argues that the initial site is protected, which is not an idiosyncratic fact of Tokyo Japanese. The protection of the initial nucleus is also evidenced in the vowel zero-alternations of Tonkawa (Yoshida Y. 1992), certain words in French (Charette 1991) and Turkish (Charette 2000, 2004), where all nuclei are subject to vowel-zero alternations except for the initial nucleus. For recent work on the special status of the initial syllable in other theories, see Becker, Nevins & Levine (2012) and references therein.

In terms of the function of initial protection, Yoshida Y. assumes that the protection of the initial nucleus serves as a parsing device demarcating the beginning of a word, following hypotheses put forth by Kaye (1989). I note that Japanese dialects differ in their tone spreading patterns, on which more see Haraguchi (1977) on the dialects of Tokyo, Owari and other locations. See also Yoshida & Zanma (2001) on Kansai Japanese pitch spreading within GP. I discuss the full facts of Tokyo and Owari pitch or tone spreading in depth in Chapter 8.

Before continuing with the analysis, let us consider an alternative proposal for the definition of a pitch accent system within GP.

5.3.3 Japanese pitch accent as a privative tone system

In a slight alteration of the GP proposal, I propose that in fact Tokyo Japanese is a privative tone language with only an active High tone. I agree with Yoshida Y. in assuming that Low tone is not encoded in the lexical or surface tone patterns of words as it is never active in the phonological processes of Tokyo Japanese – a low F0 is simply the interpretation of a nucleus with no high tone. However, the utility of assuming that Tokyo Japanese marks an accented site with a High tone has two benefits.

First, the use of H can provide a more satisfying account of high tone spreading and the fact that high tone may be sensitive to syllable structure for speakers of the Tokyo and Owari dialects. While I delay full discussion of this phenomenon until Chapter 8, it has been noted in Chapter 1 that high tone may spread to the initial mora (or nucleus) if the initial syllable is 'heavy' and is of the shape CVR, CVJ or CVN. This is seen in Owari unaccented words like light initial [sàkùrá] 'cherry tree' but heavy initial [tóómó] 'ricefield' where the high tone assigned to the final mora or nucleus spreads to the initial mora or nucleus due to heavy nature of the initial syllable. If the process of high pitch or high tone spreading were an issue of phonetic interpretation and not a phonological process, as proposed by Yoshida Y., high tone spread or high pitch spread is not expected to be sensitive to syllable structure.

Second, the classification of Tokyo Japanese as a privative tone system aligns the behaviour of a high pitch with cross-linguistic behaviour of H in privative tone languages, discussed by Hyman (2000). According to Hyman, languages such as Shona, Slave, Navajo and Somali are argued to have only an H marked tone system. This is in opposition to languages that have other privative or binary or ternary systems, which have a phonological opposition between H and L in underlying representations (e.g. Kom) or which mark L versus 0 (e.g. Dogrib) and other languages which mark H, L and 0 (e.g. Yoruba, Margi). Some hallmarks of languages marking H, but not L in underlying phonological representations include a failure to exhibit HL and LH contour tones, a failure to exhibit both H and L floating tones, constraints on H occurrence but not occurrence of L and processes exhibiting activity of H and not L, such as spreading of only the H tone and never the L, underlyingly marked as 0. Indeed, as I have noted above, H is active in Tokyo Japanese and L is never marked. H may spread and L does not. L is somewhat unconstrained in its occurrence, though it crucially does not appear on the accented nucleus in a word. Further comparison of these languages and Tokyo Japanese is necessary and will be provided in forthcoming research, but for now I claim that this evidence shows that L is not a tone active in Japanese.

I tentatively define Tokyo Japanese as a private tone language and assume that the site of an accent receives an H tone. H may be lexically associated to a certain nucleus, as in accented words, or assigned to the final nucleus, as in lexically unaccented words. To capture tone spreading, I propose that the assigned tone may then spread regressively until the initial nucleus. Any reference to an accent can be assumed below to be a high tone. I retain the other structural and licensing aspects of Yoshida Y.'s analysis. With these assumptions altered, let us now examine the licensing and accent account for Standard Japanese.

5.4 Accent Patterns in Standard Japanese

In Standard Japanese, words are found in Accented and Unaccented classes. I restrict my discussion largely to native Yamato words, though reference to loanword patterns is made. I do not discuss mimetic or Sino-Japanese words. For discussion of mimetic words, see Hamano (1996, 2006) and for in-depth discussion of Sino-Japanese compound accent, see Okuda (1971). For discussion of Sino-Japanese words and accent patterns within GP, see Yoshida Y. (2003). For fuller discussion of loanword accent patterns, see McCawley (1968) and recent work by Kubozono (2001, 2006, 2008), Shinohara (2000) and Kawahara (2015). Note that the stress of a donor language such as English has some notable effect on the accent patterns of the adapted Japanese loanword, e.g. the commonality of antepenultimate accent in three or four mora loanwords in Japanese reflecting largely source patterns in English as in [lemon] 'lemon' and Japanese [rémoN] 'lemon'.

There is a well-recognised division within native Yamato words between words of three nuclei or less and words containing four or more nuclei. Within a domain containing three full nuclei or less, each nucleus has the potential to be assigned an accent. Under Yoshida Y's analysis and those of others such as Haraguchi (1977), accented words of three or less nuclei have their accented nucleus specified in the lexicon. Unaccented words have no specified accent in the lexicon, and they are assigned a domain-final accent by default. It is also noted in the literature that Yamato morphologically simplex words of four nuclei or more receive antepenultimate accent, as in [murásaki] 'violet' and [hototógisu] 'lesser cuckoo', (Yoshida Y. 1999, Haraguchi 1991). To my knowledge, no morphologically simplex words with more than five nuclei exist. The regularity of antepenultimate accent in longer words, as well as the trend for unaccentedness in words containing three nuclei or less, is accounted for by Yoshida Y. (1999) by considering the interaction of licensing structure and word length. I first examine the facts and consider the case of words of three nuclei or less and four or more nuclei in native Yamato words. I then examine the proposal of Yoshida Y. (1999) in further depth. Crucially, the account discussed here provides explanatory power for the proliferation of unaccentedness in shorter words.

5.4.1 Accent in words with three nuclei or less

The possible accent patterns in words of three nuclei or less are recalled from chapter 1. The examples in (13) illustrate the accent patterns found in Tokyo Japanese nouns of up to three nuclei. The accented nucleus in lexically accented words is marked with an asterisk, while high pitch is overlined. In text, these words are marked with an acute accent, as in the initially accented /námida/ 'tear'. Unaccented words are generally accepted to be underlyingly unaccented, receiving a final high pitch upon phonetic interpretation. In text, I do not mark unaccented words with an accent in underlying forms, e.g. /sakura/ ‘cherry blossom’. Forms with the accentless nominative particle /ga/ are also shown in the second column to show the retention of lexical accents in NPs.

(13) Pitch Accent Patterns for Tokyo Japanese nouns (Haraguchi 2001:6)

a. Unaccented word patterns of mononuclear, binuclear and trinuclear words

Noun	Noun+NOM	Gloss
e	e ga	‘handle’
ha ɕi	ha ɕi ga	‘edge’
sa ku ra	sa ku ra ga	‘cherry tree’

b. Accented word patterns of mononuclear, binuclear and trinuclear words

*	*	
e	e ga	‘picture’
*	*	
ha ɕi	ha ɕi ga	‘chopstick’
*	*	
ha ɕi	ha ɕi ga	‘bridge’
*	*	
ka ra su	ka ra su ga	‘crow’
*	*	
ko ko ro	ko ko ro ga	‘heart
*	*	
o to ko	o to ko ga	‘boy’

The above nouns show all potential accent patterns. Any nucleus has the potential to exhibit a lexical accent. Following Yoshida Y. (1999) and others, I assume that for accented words, accent is marked in the lexicon as it is an unpredictable property of these words. Unaccented words, on the other hand, are lexically unmarked and receive a domain-final accent. The involvement of foot structure is discussed shortly.

No difference is found between a finally accented word and an accentless word in isolation. In the course of phonological derivation and phonetic interpretation, the final nucleus is realised with high pitch in a final-accented word, such as /otokó/ ‘boy’ and an unaccented word, such as /sakura/ ‘cherry tree’. However, the difference between unaccented and accented words is clear when nouns are affixed with an accentless particle, such as the nominative particle /-ga/. An accented word retains its lexically marked accent, as in [otokóga] ‘boy-NOM’, while the nominative form of an accentless word is assigned domain final accent, found on /ga/ in [sakuragá] 'cherry tree-NOM'.[8] See 5.5.1 for discussion of nominative forms in further detail.

5.4.2 Accent assignment trends in words of three nuclei or less

While Yoshida Y. assumes that accented words have the accented nucleus marked in the lexicon, the proportion of accent assignment is curiously skewed in native Yamato words containing three nuclei. Drawing on the accent data provided from Hirayama (1957), Yoshida Y. presents figures which show that for binuclear words, the proportion of accent is roughly equal between initially accented, finally accented and unaccented words. I also show below the distribution of accent within mononuclear words, drawn from Hirayama (1957). As for words containing three nuclei, Yoshida Y. has pointed out that the location of accent is not equally distributed in nouns. Consider the figures for accent location of morphologically simplex words below.[9]

(14) Accent distribution of mononuclear Yamato words (drawn from Hirayama 1957)

Accent Location	Number	Example
Accented	20	/hí/ 'fire'
Unaccented	13	/hi/ 'day'
Total	33	

(15) Accent distribution of binuclear Yamato words (Yoshida Y. 1999)

Accent Location	Number	Example
Accented N_1	49	/háɕi/ 'chopsticks'
Accented N_2	59	/haɕí/ 'bridge'
Unaccented	50	/haɕi/ 'edge'

[8] I expand on the definition of 'domain' within GP below.
[9] Kubozono (2006) presents further statistics showing accent distribution in words with three nuclei or less, but it is unclear if the statistics presented conflate morphologically simplex and complex forms.

(16) Accent distribution of trinuclear Yamato Words (Yoshida Y. 1999)

Accent Location	Number	Example
Accented N_1	24	/zákuro/ 'grenadine'
Accented N_2	1	/kokóro/ 'heart'
Accented N_3	26	/warabí/ 'bracken'
Unaccented	62	/kasumi/ 'haze'

In further support of the accent figures for three nucleus words found in (16), I add below figures drawn from Iwai & Kitahara (1995).[10] Examining only three-nucleus nouns marked as morphologically simplex, the markedness of medial accent and the unmarkedness of unaccented patterns remains consistent with figures that Yoshida Y. presents from Hirayama (1957).

(17) Accent figures for three-nucleus Yamato words (Iwai & Kitahara 1995)

Accent Location	Number	Percentage
Accented N_1	103	13%
Accented N_2	31	4%
Accented N_3	146	19%
Unaccented	487	64%
Total	767	100%

Based on the above figures in (14) and (15), accent patterns in words with one or two nuclei are roughly proportional. Yoshida Y. proposes that the accent location and the accented or unaccented status of a word is not predictable and thus must be a property of the lexical entry.

It is clear from the figures in (16) and (17) that for words containing three nuclei, accent on the medial nucleus is dispreferred. Yoshida Y. notes that the only lexical item with medial accent found in Hirayama (1957) is [kokóro] 'heart', while further noting the word [tamágo] 'egg'. Further words with medial accent are evidenced in Iwai & Kitahara (1995), such as [anáta] 'you' and [nanáme] 'diagonal'. Initial and final accented patterns are more common, while unaccented words are the most common.

[10] I thank Prof. Kitahara for providing me with a copy of this corpus. The corpus is a digitised accent dictionary based on the pronunciations in NHK (1985) with additional information on wordclass and morphological boundaries added.

In the speech of Tokyo speakers (as of 1994), Yoshida Y. notes that some finally accented Yamato words have undergone a shift to become Unaccented words.[11] This is evidenced in the attested forms of a word in dictionaries, as certain words are shown as finally-accented in Hirayama (1957) with alternative unaccented forms listed in NHK (1984). Yoshida Y. (1999:91-92) notes that in the speech of Standard Japanese speakers in 1994, certain forms which were formerly finally accented are now fully unaccented, as for the word /itaʨí/ 'weasel', now /itaʨi/. In addition, the medially accented word /tamágo/ 'egg' also shows an unaccented variant, /tamago/. I discuss accent change further in 5.4.7.

In loanwords with three nuclei, Yoshida Y. points out that words are either initially accented in recent loans, such as /térebi/ 'TV', or unaccented as in older and well-integrated loanwords, such as /tabako/ 'tabacco'. Yoshida Y. claims that loanwords are not found in medial or final accented patterns. More recent work by Kubozono (2008:167,170) notes that that for three-mora loanwords (n=778), 93% are accented and 7% are unaccented. Of the accented words, 96% are accented on the initial mora, 2% on the medial mora and 2% on the final mora. These figures align roughly with the statement made by Yoshida Y., and I tentatively claim, for the moment, that antepenult, medial and final accent are largely derived from the original stress of a loanword while unaccented words are treated like native words for purposes of accentuation. I provide only partial discussion of loanwords, but see Kubozono (2006) and Itō & Mester (2016) for formal analysis and discussion of loanwords and accent assignment. Yoshida Y. (1999) does provide some comparison of foot structure in loanwords and native Yamato words, which I provide below.

5.4.3 Accent in simplex words with four or more nuclei

Accent in Yamato words containing four or five nuclei have antepenultimate accent as in the words [murásaki] 'violet', [ugúisu] 'bush warbler', and [hototógisu] 'lesser cuckoo'. (Haraguchi 1991, Yoshida Y. 1999) Yoshida Y. also notes that loanwords have a similar pattern (McCawley 1968, Haraguchi 1991, Yoshida S. 1991) such as [razánia] 'lasagne' or [arubáito] 'Ger. *arbeit*, part time work'. The accent patterns are shown below, with the accent site marked with a circumflex beneath the

[11] Kawahara (2015) notes the opposite shift in adjectives, with unaccented words shifting to the accented pattern. I note that this shift is complete in the Owari dialect; only accented adjectives are evidenced in this dialect. See Terakawa (1985) for a description of the facts.

nucleus. This mark serves to differentiate long words from short accented words containing three nuclei or less.

(18) Standard words containing more than three nuclei

a. Yamato words containing four or more nuclei (Yoshida Y. 1999:78)

[mu $\overline{\text{ra}}$ sa ki] ^	'violet'
[u $\overline{\text{gu}}$ i su] ^	'bush warbler'
[ho $\overline{\text{to to}}$ gi su] ^	'lesser cuckoo'

b. Loanwords containing four or more nuclei (Yoshida Y. 1999:93)

[ra $\overline{\text{za}}$ ni a] ^	'lasagna'
[pu $\overline{\text{ro gu}}$ ra mu] ^	'program'

5.4.4 Licensing structure in four or five nuclei words

To account for the antepenultimate accent patterns shown above, Yoshida Y. proposes that the licensing structure of a word explains the regularity of this accent pattern. Recall from the discussion in 5.2 that the unlicensed head of a domain receives an accent. This head is derived by foot structure, understood by Yoshida Y. to be licensing structure. To derive the appropriate structure, the following statements are proposed.[12]

[12] The parameters in (a) here are not exhaustive in terms of capturing stress or accent systems. I discuss the projection parameters regarding special moras in the following chapter and in the conclusion of this thesis to account for dialect variation. For discussion of projections and licensing in stress systems and relevant parameters within GP, see Charette (1991), Harris (1994), Scheer & Szigetvári (2005) and Ulfsbjorninn (2015).

(19) **Licensing of Nuclear Heads** (Yoshida Y. 1999:77)

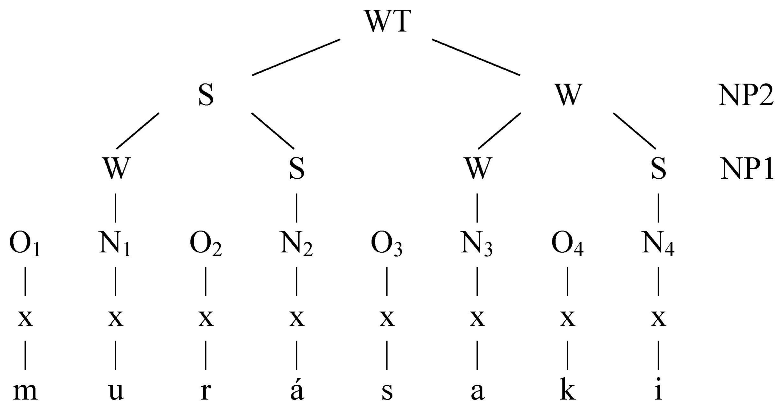
a. The direction of licensing between nuclear heads is head-final at nuclear projection 1. In metrical terms, feet are right-headed in Standard Japanese.

b. The interpretation of pitch accent is that the accent nucleus (the head of the domain) and the nuclei to the left are all high-pitched.[13]

c. Domain-initial nuclei are inaccessible, and thus are not subject to high pitch sharing.

Consider again the structure of the word [murásaki] 'violet', reproduced in (20) and the structure of [hototógisu] 'lesser cuckoo' in (21). Binary head-final feet are built from the right edge. These feet then engage in licensing relations themselves, with full binary feet engaging in head-initial relations. Yoshida Y. proposes that any further relations within a domain are head-final. Utilising these this formulation, the accent pattern is derived as follows.

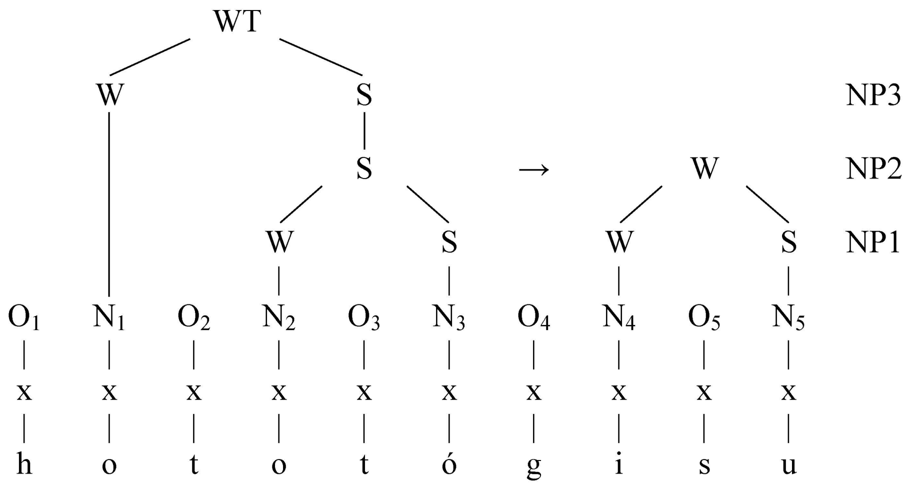
(20) Foot structure of [murásaki] 'violet'



In the structure shown in (20), all nuclei project and head-final feet are formed building from the right edge of the word. In [murásaki], two feet are formed. Yoshida Y. proposes that the resultant feet contract a head-initial relation. The head of the penultimate foot is thus the head licensor and the antepenultimate nucleus is accented.

[13] Note that this original text does not reflect the ban on high pitch on an initial nucleus unless it is the initial nucleus. A more accurate formulation is: 'The interpretation of pitch accent is that the accent nucleus (the head of the domain) and the nuclei to the left are all high-pitched excepting the initial nucleus'.

(21) Structure of [hototógisu] ‘lesser cuckoo’



As for the structure of a word with five nuclei, such as [hototógisu] ‘lesser cuckoo’ in (21), two binuclear feet and one mononuclear foot are built from the right edge. The mononuclear foot, N_1, formed at NP1, projects. At NP2, this foot is weak according to Yoshida Y. as it is not formed of two nuclei. The antepenultimate foot, being mononuclear, thus cannot license the head nucleus of the penultimate foot at NP2, and it does not participate in foot licensing relations and projects once again. Yoshida Y. proposes that above NP2, all licensing relations are head-final. At NP3, the head of the penultimate foot, N_3, licenses the foot, formed of N_1.[14] Accent is assigned to the ultimate unlicensed nucleus, N_3.

Note that the accent assignment above is regular and is derived from the formation of at least two well-formed feet. In the above words, accent is derived from the head of the penultimate foot. This is in contrast to the patterns found for words with three nuclei or less, where only one well-formed foot is formed. I now turn to the structure of unaccented words with three nuclei or less, followed by an examination of the structure of accented words.

5.4.5 Licensing in the derivation of ‘unaccented’ words

Let us now consider the assignment of accent in unmarked ‘unaccented’ Yamato words, proposed as default for those containing 3 or fewer nuclei. Unaccented words have domain-final accent, which Yoshida Y. accounts for by utilising the same parameters for licensing as proposed above in (19). Unaccented words do not have their

[14] The only clear exception to this pattern in native words is the word [inoɕíɕi] ‘boar’ (listed in Iwai & Kitahara 1995). I do not propose a particular analysis of this word, but I assume it is a lexically marked exception to the unmarked trend, as with medially accented words such as [tamágo] ‘egg’, discussed below.

accent marked in the lexicon. Accent is instead derived through foot building. Below, I present the lexical representations of unaccented words in (22) and their derived foot structures in (23)-(25). Recall that Yoshida Y. (1999) proposes that the foot is built by default from the right edge of the word, with unaccented words containing one, two and three nuclei being analysed as follows.

(22) Underlying representation of unaccented words

a. Lexical representation of /hi/ 'day'

O_1	N_1
|	|
x	x
|	|
h	i

b. Lexical representation of /hana/ 'nose'

O_1	N_1	O_2	N_2
|	|	|	|
x	x	x	x
|	|	|	|
h	a	n	a

c. Lexical representation of /kuruma/ 'car'

O_1	N_1	O_2	N_2	O_3	N_3
|	|	|	|	|	|
x	x	x	x	x	x
|	|	|	|	|	|
k	u	r	u	m	a

(23) Derived structure in [hí] 'day'

	S
	|
O_1	N_1
|	|
x	x
|	|
h	i

In a mononuclear word such as [hi] (21), only one nucleus may project and no derivation of licensing relations is necessary. N_1 is the ultimate head of the domain, being unlicensed, and is assigned an accent. However, the behaviour of this foot in /hi/ 'day' in morphologically complex words is different to that of a lexically assigned accent as in /hí/ 'fire'. I revisit the behaviour of unaccented versus accented words with regards to compounding and affixation in 5.5.

(24) Derived structure, giving [haná] 'nose' (Yoshida Y. 1999:87)

```
        W   ←   S
        |       |
  O1    N1  O2  N2
  |     |   |   |
  x     x   x   x
  |     |   |   |
  h     a   n   a
```

In a binuclear word, only one head-final foot is formed, giving rise to a finally accented word. The head of this foot is the licensor of the domain, and the ultimate nucleus receives accent assignment.

(25) Derivation of accent in /kuruma/ [kurumá] 'car' (Yoshida Y. 1999:88)

```
       W    ←    ←    S
       |           /     \
       |          W   ←   S
       |          |       |
  O1   N1   O2    N2  O3  N3
  |    |    |     |   |   |
  x    x    x     x   x   x
  |    |    |     |   |   |
  k    u    r     u   m   a
```

In a trinuclear word as in /kuruma/ 'car', a foot is formed at the right edge and the remaining nucleus forms a mononuclear foot. These feet then engage in a head-final licensing relation as shown in (25). In the above word, Yoshida Y. proposes that a mononuclear foot cannot license a binuclear foot as it is not the preferred binuclear foot, as discussed in the structure of [hototogisu] 'lesser cuckoo'. In all of the above words, the ultimate nucleus is designated as the head of the domain and is accordingly the accented nucleus in the surface form, e.g. [kurumá] 'car'. In all of the above words, a surface final-accent is found in a word which underlyingly lacks an accent, as the final nucleus is the unlicensed nucleus once relations have contracted. The default result of antepenultimate accent is only found when two feet may be formed with the head of the penultimate foot licensing the head of the ultimate foot at NP2, as seen earlier in a word such as [murásaki] 'violet'. The assignment of accent, or High tone, to the final mora is also reminiscent of the assignment of melodic highs in toneless verbs as seen in many

Bantu languages (cf. Bickmore & Odden 2014). However, in Japanese nouns the assignment of final H in nouns is here due, at least in part, to the foot structure built within a word. Assignment of a final melodic High is one way to view the assignment of high tone within accentless verbs, however. (I expand on this possibility in forthcoming work). See also Pierrehumbert and Beckman (1988) where the final high tone in accentless words is attributed to the realisation of phrasal boundary tones.

However, the accented nucleus and head of the domain is not always derived. Accented words exhibit the potential to be accented on any of the nuclei within a domain, and they also retain their accent in morphologically complex phrases. Let us now turn to accented words to further examine the relevance of foot structure.

5.4.6 The structure of accented words

To account for the markedness of medial accent as well as the shift of finally and medially accented words to unaccented words, let us consider the licensing structure of an accented word. Accented words have their accented nucleus marked in the lexicon, and it is this nucleus which is the licensor of the domain. Foot structure is then derived from this nucleus. Consider first the structures below in (26) for accented words consisting of one or two nuclei, which show no marked accent trends. The below structures are not found in Yoshida Y. (1999) but I propose the following structures based on the theory of licensing found within this work.

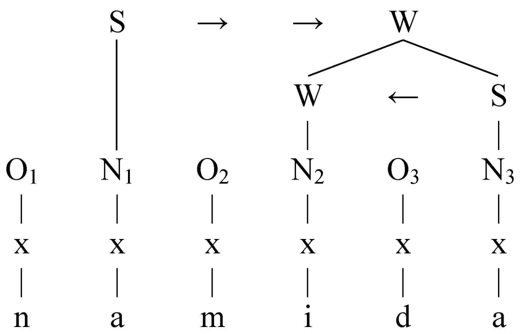
(26) Lexical structure of accented mononuclear and binuclear words

a. /hí/ 'fire'		b. /háɕi/ 'chopsticks'				c. /haɕí/ 'bridge'			
	S		S	→	W		W	←	S
	|		|		|		|		|
O_1	N_1	O_1	N_1	O_2	N_2	O_1	N_1	O_2	N_2
|	|	|	|	|	|	|	|	|	|
x	x	x	x	x	x	x	x	x	x
|	|	|	|	|	|	|	|	|	|
h	i	h	a	ɕ	i	h	a	ɕ	i

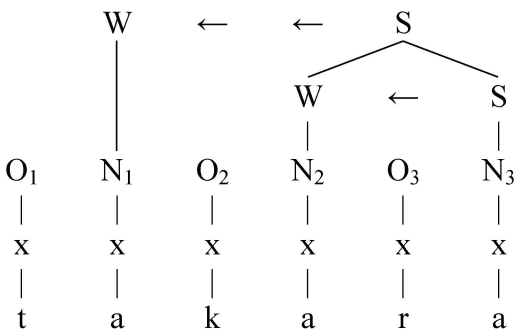
In a word with one nucleus, only this nucleus has the potential to be the licenser and head of the domain, with the head of the structure marked in the lexical entry, /hí/ 'fire'. In a word with two nuclei, one foot is formed between the projections of nuclei at NP1 and either nucleus has the potential to be the strong member of a foot. While the structure of an initially accented binuclear word such as /háɕi/ 'chopsticks' seemingly violates the licensing parameters presented for accent assignment previously, note that these words have lexically defined accent and not derived accent. Lexically marked accent is not restricted to the same parameters as a derived accent and any nucleus may be the head of a domain if learned as such in the process of acquisition. Parameters are only used to derive accent where it is not lexically marked.

I now examine the structure of accented words with three nuclei. Consider the following structures for initial, medial and finally accented words. Recall that the foot is built from the right edge of the domain in the unmarked case of unaccented words. As Yoshida Y. only gives the structure of unaccented three nuclear words and does not discuss the foot structure of accented words, I present hypothetical licensing structures below. To clarify, note that that S is the licensor in the below trees while W is the licensed nucleus or foot at the relevant projection. I extrapolate the surface structure of [námida] 'tear' from structures given for loanwords by Yoshida Y. (1999:95).

(27) Representation of an initially accented word, [námida] 'tear'



(28) Representation of a finally accented word, [takará] 'treasure' (Yoshida Y. 1999)

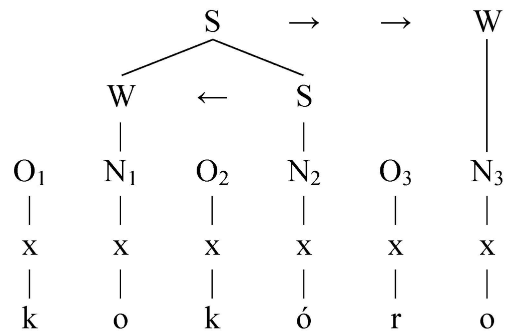


Utilising the foot structure proposed by Yoshida Y., I construct the above foot structures for accented words containing three nuclei. A finally-accented word has an identical foot structure to that of an unaccented word. An initially-accented word has the penultimate mononuclear foot as the licensor, as this nucleus is lexically defined as the accented nucleus.

For initially accented words, Yoshida Y. (1999:95) presents the structure of an initially accented word as headed by the N_1. I assume this structure also applies to Yamato words such as [námida] ‘tear’.[15] While Yoshida Y. does propose that a mononuclear foot cannot license a fully formed binuclear foot in unaccented words, I presume that lexical accent need not respect the principles of derived accent.

I now extend Yoshida Y.’s proposal to medially accented words such as /kokóro/ ‘soul’. We have seen in 5.4.2 that medial accent is rather marked, with only one word with medial accent attested in Hirayama (1957). I noted thirty-one further tokens in Iwai & Kitahara (1995). These words represent only 4% of the total number of three-nucleus words. I tentatively propose the below possible representations for their foot structure.

(29) [kokóro] ‘heart’ with ultimate mononuclear foot licensed by penultimate right-headed foot



In the representation in (29), this word consists of a degenerate mononuclear foot at the right edge, licensed by the penultimate right-headed and well-formed binuclear foot. This structure goes strongly against the trend for the construction of a binary foot on the right edge of a domain, assuming the parameters earlier proposed calling for foot construction from the right edge. Crucially, the Licensing Principle is respected, as there is only one unlicensed nucleus (N_2). This odd structure above may account for the markedness of medial accent in the lexicon, and could also account for

[15] See Kubozono (2008) for a discussion of the antepenultimate accent as default for loanwords with a different foot model, considering the last mora to be extrametrical. Regardless of how one analyses the data, Standard Japanese is likely changing accent patterns from a default unaccented pattern seen in Yamato words to the ‘newer’ antepenultimate pattern. It is also possible, however, that the common nature of antepenultimate accent in loanwords simply reflects English donor stress. I leave this issue to further research, though English stress cannot account for all accent patterns.

cases where speakers shift medial-accented forms to a more unmarked, unaccented form. Let us now briefly consider accent shift, previously mentioned in 5.2.2.

5.4.7 The shift to an unaccented pattern in three-nucleus words

Yoshida Y. (1999) notes that there is an on-going accent shift in words of three nuclei, where medial and final accented words are changing to unaccented words, with /tamágo/ 'egg' and /itatɕí/ 'weasel' having alternate forms in the speech of younger speakers as unaccented /tamago/ and /itatɕi/. No change in initially accented words is evidenced. More recently, the trend of accent loss, known as *heibanka* or 'flattening', is also systematically investigated and empirically confirmed to exist in younger Tokyo speakers by Kobayashi (2002), and this loss of lexical accent is also currently noted and discussed in popular press regarding changes in pronunciation (NHK 2015). Kawahara (2015) also discusses a slightly different shift to unaccented patterns in cases of *senmonka akusento* or 'specialist accent', where accented loanwords are treated as underlyingly unaccented by those in specialist occupations, e.g. tennis racket is canonically /rakét:o/ [rakét:o], but may be unaccented as in /raket:o/ [raket:ó] when in use by tennis players.

With regards to words where accent shift is not evidenced, as in antepenultimate accented trinuclear words, Yoshida Y. claims that the stability of initially accented words is possibly due to the fact that its antepenultimate accent matches the pattern in Japanese. Recall that antepenultimate accent is the default pattern for words of four nuclei or more. The unmarked status of antepenultimate accent is also extensive in loanwords (McCawley 1968). I note that this includes loanwords containing three moras, discussed by Kubozono (2008) and Kawahara (2015).[16] Considering loanwords, Yoshida Y. notes that in Hirayama (1957), loanwords with three nuclei are found only in initially accented and unaccented patterns, as in /pánda/ 'panda bear' and /baketsu/ 'bucket'. In other works such as Kubozono (2008), the initially accented or antepenultimate accent pattern predominates in increased databases of loanwords. It is possible that the antepenultimate accent pattern in *all* word lengths is unmarked due to influence from loanwords, leading speakers to preserve initially accented Yamato words.

[16] Unaccented loanwords do exist in words of three nuclei, e.g. /tabako/ 'tabacco', as well as in longer recent loanwords as in /buradʑiru/ 'Brazil'. It can be said that unaccented loanwords are somewhat marked: Kubozono (2008:167) notes that of 778 loanwords containing three moras, only 7% are unaccented. Of the accented loanwords, 96% of accented loanwords have antepenultimate accent according to Kubozono (2008:170). See Itō & Mester (2016), Kawahara (2015), Kubozono (2011) and references therein on the characteristics of unaccented loanwords.

Yoshida Y. further notes that there is also shift of some finally accented words (such as /itatɕi/ ‘weasel’) and some medially accented words (such as /tamágo/ ‘egg’) towards the unaccented accent pattern. She makes no claim as to the cause of this shift, and notes further that this trend is not witnessed in forms with one or two nuclei. To capture such a shift, I assume that learners or speakers delete lexical foot structure and store forms with no licensing structure pre-specified in the lexicon. This is particularly convincing for medially-accented words, where the foot structure I propose does not have a foot built from the right-edge. With regards to finally-accented words shifting to unaccented words in underlying forms, note that there is an identical structure for unaccented and finally-accented words in isolation. While the behaviour of finally-accented and unaccented words is different when suffixed with a particle (discussed later in 5.5.2), their identical foot structure in surface isolation forms and their identical pitch patterns may lead learners and speakers to infer that a surface finally accented word is an unaccented word.

5.4.8 Concluding the account of morphologically simplex words

In morphologically simplex words, the above proposal from Yoshida Y. (1999) defines the accented nucleus in a word as the unlicensed head of a word or domain following the Licensing Principle. I have redefined Tokyo Japanese pitch accent as a system where a High tone is assigned to this head nucleus and may spread regressively, while a phonetic low tone is specified as zero underlyingly.

With regards to the structure of unaccented and accented words, first unaccented words do not have their accented nucleus or head nucleus marked in the lexicon, while accented words are proposed to have the accented nucleus specified in the lexicon. In order for a head to be derived, nuclei and their projections form licensing relations, with licensing relations being head-final at the first projection, head-initial at the second projection and head-final at further projections. Antepenultimate is thus derived in words where two or more ‘feet’ (or nuclei in a binary licensing relation) can be formed. Ultimate surface accent is found in unaccented words as only one well-formed foot or less can be formed in the contraction of licensing relations. Accented words have their licensing structure specified in the lexicon, and it may have structure which would otherwise not be predicted by the licensing parameters for nuclear projections proposed by Yoshida Y. (1999).

Building on this foundation, I now turn to morphologically complex words and the accent patterns found therein. Utilising the Licensing Principle, Yoshida Y. derives the necessary accent patterns utilising the lexical and derived accents in combination with a theory of domain projection to provide an explanation for relevant patterns.

5.5 Accent in morphologically complex words

To account for accent assignment in morphologically complex words, I first introduce the theory of analytic and non-analytic domains, which Yoshida Y. applies to suffixed nouns and compound nouns. This theory accounts for the accent patterns in noun-particle and noun-noun compounds in a straightforward manner, using the construction of licensing relations between nouns and other morphemes in the computation of morphologically complex domains. Following a brief presentation of the theory of Analytic and Non-Analytic domains (Kaye 1995), I examine nouns suffixed with accentless particles such as /-ga/. I then examine Yoshida's account of true noun-noun compounds. I extend her proposal to also provide an account for dominant and yielding accented suffixes (McCawley 1968, Nishiyama 2010, Labrune 2012). I restrict this section to the discussion of nouns, due to variation found in adjective and verb accent patterns in the available accent dictionary materials. See Nishiyama (2010) and Kawahara (2015) for recent discussion of verbal accent. For some analysis of verbal accent utilising analytic and non-analytic domains, see Yoshida Y. (1999) and Poppe (2012).

5.5.1 Analytic and Non-Analytic domains

Yoshida Y. (1999) applies the theory of analytic and non-analytic domains (Kaye 1995) to account for accent assignment in morphologically complex words such as noun-noun compounds. Kaye (1995:302) states that "…Morphological structure has two effects on the phonology: little and none. These two interactions are called **Analytic** and **Non-analytic**." (Emphasis mine.) An analytic morpheme has its own phonological domain in which phonology applies, with morphologically complex words composed of analytic domains having multiple domains to which phonology applies. Analytic domains are found in two forms. A word composed of two forms may have the domain shapes [[A][B]], with two analytic domains where phonology applies, [A] and [B], and a concatenated domain where phonology applies once again, [AB] as in a compound [[noun][noun]] like [[black][board]]. The morpheme projecting phonological domain [B] in this case is what I term an independent domain. Words may also be formed where B does not provide its own independent domain [[A]B], where I call [B] a dependent domain.[17] The [A] domain is first assessed, followed by the domain [AB]. A noun or verb and a dependent analytic suffix have the domain shape of [[stem]suffix]], as in RP [[post]man] or regular past tense forms such as [[seep]d].

Non-analytic morphology lacks a phonological domain and non-analytic words are of the shape [AB]. Non-analytic morphology brings no phonological domain to a morphologically complex word, giving a suffixed stem the shape of [stem-suffix]. Analytic affixes are roughly equivalent to Level 2 affixes in Lexical Phonology (Kiparsky 1982, 1985) while non-analytic affixes are roughly equivalent to Level 1 affixes. Kula (2008) has also called a non-analytic suffix a synthetic suffix. For more on the interaction between phonology and syntax in this theory including discussion of spell-out, see Scheer (2011) for further discussion beyond what is presented here..

The processing of morphologically complex domains within Government Phonology consists of two functions under Kaye's formalism: the Phonology function (φ) and the Concatenation function (concat). There is only one set of unordered phonological processes posited in GP, with no stratification of rules. Each domain is scanned by the phonology function, with processes applying wherever their conditions are met. Once all possible processes have applied within a domain, this domain is concatenated with any neighbouring domain and the process is repeated, until all domains are processed. The domain is then ready for phonetic interpretation. More formally, GP considers a word ready for interpretation when all positions are licensed.

GP does not permit resyllabification or removal of licensing or governing relations at any point during the derivation of a morphologically complex domain.[18] This is captured succinctly in the Projection Principle, given below. Kaye (1992, 1995) further proposes that the Principle of Strict Cyclicity (Kean 1974, Kaye 1992) regulates morpho-phonological computation within GP. Lastly, Kaye proposes the Minimality Hypothesis (Kaye 1992). [19] These statements are reproduced below in (30)-(32).

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[17] Further domain structures are theoretically possible but I do not discuss these possibilities here. See Kaye (1995) for discussion of possibilities of English and Kula (2002) for a discussion of Bemba.

[18] This includes the banning of constituent deletion; no constituent is ever elided/removed/deleted in lenition processes and only the segment is targeted in such a process. With regards to the deletion of the velar stem-final consonants k/g seen in past tense formation, the synchronic nature of elision in verb stems is not supported by the neurolinguistic/experimental literature on this topic – see Chapter 2, footnote 13 for more on the diachronic nature of consonant loss and Youngberg (2015) for more on verb lenition with regards to the Owari dialect. For one possible case of empty and unlicensed constituent deletion in the course of a derivation, see Kaye & Gussmann (1993) on Polish.

[19] See Scheer (2011) for further discussion of Kaye (1992, 1995) with respect to the morpho-syntax interface.

(30) **The Projection Principle** (Kaye, Lowenstamm & Vergnaud 1990:221)

> Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation.

(31) **The Principle of Strict Cyclicity** (Kean 1974:179)

> On any cycle A, no cyclic rule may apply to material within a previous cycle B without making crucial use of material uniquely in A.

(32) **The Minimalist Hypothesis** (Kaye 1992)

> Phonological processes apply wherever their conditions are met.

The Projection Principle bans deletion of licensing and governing relations, though relations may be *added* in the course of a derivation. Following the PSC, alteration of a domain to which phonology has applied is banned. The Minimality Hypothesis assumes that no strict ordering of processes is allowed during the derivation of a well-formed phonological word. Phonological processes are not stratified as in Lexical Phonology (Kiparsky 1985) or Stratal Optimality Theory (Bermudez-Otero 2015); only one set of processes per language is postulated by Kaye (1995).

One may question whether accent assignment is a set of ordered processes. It is not. Accent rules are not levelled or ordered within a domain – accent is assigned to the unlicensed head of a domain. Accent assignment in words composed of more than one analytic domain is more complex, however, due to the licensing relations constructed cyclically within morphologically complex domains.

Domains show their existence through the preservation of accent or stress in a domain, or through termination of a process such as vowel harmony. They also show their existence in the creation of consonant sequences which are impermissible in a morphologically simplex word, such as Standard Japanese [rondoNk:o] 'Londoner', derived from [[rondoN]k:o]. Below, we apply the theory of domains to account for certain Standard Japanese noun-particle and noun-noun compound accent patterns. The lack of accent retention in compounds as an effect of domain structure is discussed below.

5.5.2 Nouns and unaccented particles

I now consider suffixed nouns as presented by Yoshida Y. Accented nouns retain their accent upon suffixation with unaccented particles such as /-ga/ 'NOM' as in /kárasu-ga/ [kárasuga] 'crow-NOM'. Unaccented words, however, behave differently.

These words are normally accented on the final nucleus of the domain as in /sakura/ [sakurá] ‘cherry tree’. The domain-final accent extends to the domain final nucleus upon suffixation, as in the nominative form /sakura-ga/ [sakuragá] ‘cherry tree-NOM’. Consider once again the data for accent patterns of words with three nuclei or less in (33).

(33) Pitch Accent Patterns for Tokyo Japanese nouns (Haraguchi 2001:6)

a. Unaccented word patterns of mononuclear, binuclear and trinuclear words

Noun	Noun+NOM	Gloss
[e]	[e ga]	‘handle’
[ha ɕi]	[ha ɕi ga]	‘edge’
[sa ku ra	[sa ku ra ga]	‘cherry tree’

b. Accented word patterns of mononuclear, binuclear and trinuclear words

[e]	[e ga]	‘picture’
[ha ɕi]	[ha ɕi ga]	‘chopstick’
[ha ɕi]	[ha ɕi ga]	‘bridge’
[ka ra su]	[ka ra su ga]	‘crow’
[ko ko ro]	[ko ko ro ga]	‘heart
[o to ko]	[o to ko ga]	‘boy’

To account for the above data, Yoshida Y. (1999:146-151) proposes that the above words have the analytic domain shape [[A]B], or [[noun]particle].The phonology assesses the [noun] domain and assigns domain-final accent if no accent is present in the lexical entry. This is followed by concatenation of the nominal [A] and dependent particle [B] domain, with further phonology assessment of the resultant [noun-particle] domain. Consider the following combination of the Analytic unaccented particle /-ga/ ‘NOM’ with the Accented word [námida] ‘tear’ and Unaccented [kuruma] ‘car’.

(34) Representation of nominative derivations in [[A]B] domains (Yoshida Y. 1999:147)

a.	[[ku $\overline{\text{ru ma}}$]	+	ga]	=	[ku $\overline{\text{ru ma ga}}$]
	'car'		NOM		
b.	[[$\overset{*}{\overline{\text{na}}}$ mi da]	+	ga]	=	[$\overset{*}{\overline{\text{na}}}$ mi da ga]
	'tear'		NOM		

When the [A] domain is accented, as in /námida/ 'tear', the lexically marked accent is retained in the final [AB] domain, as in [námidaga] 'tear-NOM'. In the nominative form of an accentless word such as /kuruma/ 'car', the nominative form is to [kurumagá] 'car-NOM'. Accent is assigned to the final nucleus in the accentless [AB] domain, as with morphologically simplex unaccented words. To account for the accent relocation in accentless words and the retention of lexical accent in accented words, Yoshida Y. proposes the Lexical Marking Principle.

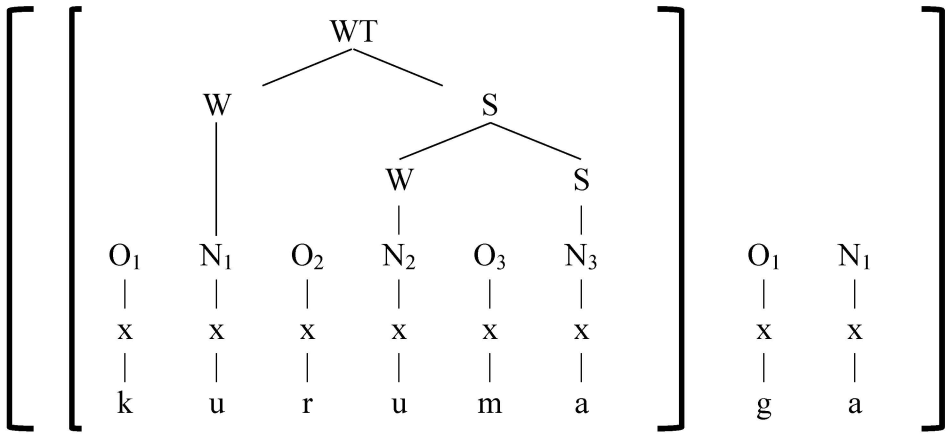
(35) **Lexical Marking Principle**

A lexically marked nucleus, i.e. a nuclear position which is stressed/accented lexically, is the inherent licensor of a domain, and thus cannot be a licensed member in its own domain.

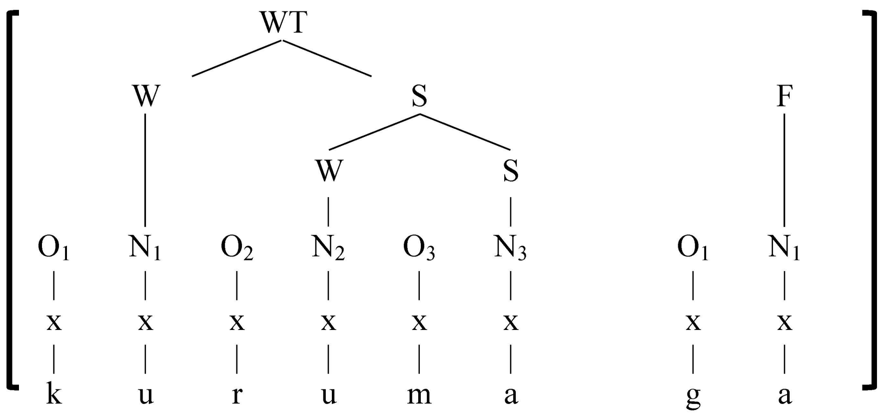
Yoshida claims that this principle applies to words with accent assigned in the lexicon. Following this principle, the nucleus which is lexically marked as the head of a simplex domain must be retained as the head of a complex domain, as in the alternation [námida]/[námidaga] 'tear, tear-NOM'. The derived licensor in domain [A] here may itself be licensed as it is not a lexically marked head. Consider the derivation of the accentless noun /kuruma/ 'car' in (36), drawn from Yoshida Y. (1999).

(36) Accent assignment for /kuruma-ga/ ‘car-NOM’ (Yoshida Y. 1999:149-150)

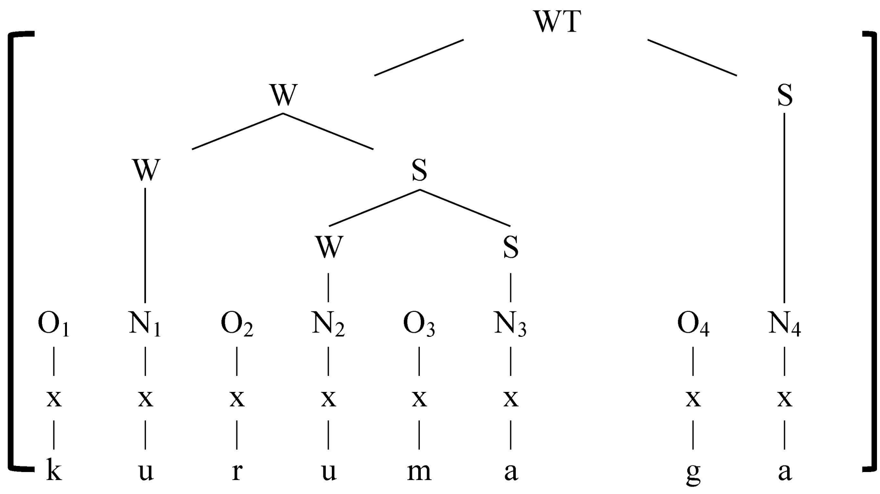
a. Projection of feet in domain [A], [kurumá]



b. Concatenation of domains and projection of foot in /-ga/



c. Contraction of head-final licensing relation, resulting in [kurumagá]

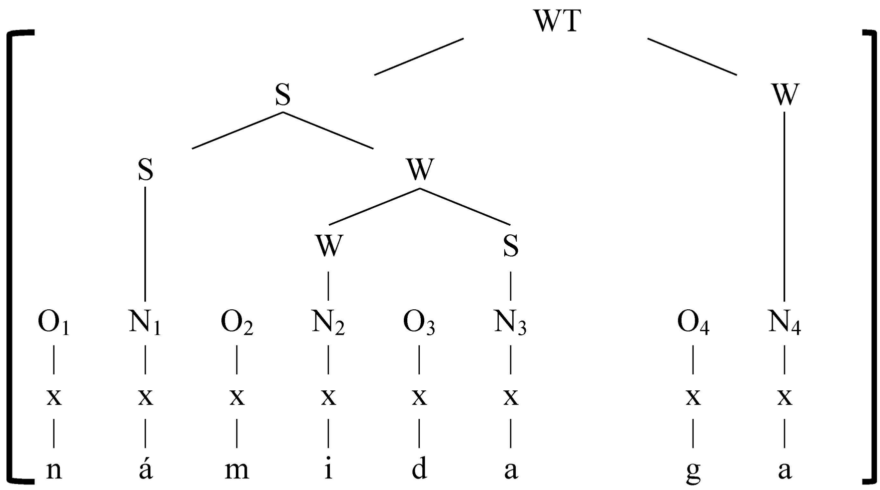


In the derivation of an accentless morphologically complex word of the shape [[A]B], a domain-final accent is derived in domain [A] as usual, as in (a) /kuruma/ [kurumá] ‘car’. In the domain [AB], the head of domain [A] and the foot projected in

[ga] must engage in a licensing relation. Yoshida Y. presumes that the right-headed nature of accent in complex words is drawn from the syntactic fact that there is a strong preference for right-headedness in Japanese. (This is discussed below in the discussion of compound nouns.) She then proposes that the rightmost foot, formed in [ga], licenses the preceding derived head nucleus in [kurumá], giving the domain final accent as in [kurumagá]. Note that if this structure were Non-Analytic with no internal domains, or /kuruma-ga/ as [kurumaga], antepenultimate accent would be expected through the formation of two binary feet, as seen earlier in the word [murásaki] ‘violet’.

As for words with a lexical accent as with /námida/ ‘tear’, the lexical accent must remain the licensor of the domain, as per the Lexical Marking Principle. Thus, the nominative form of [námida] ‘tear’ is [námidaga], with the mononuclear foot in [ga] licensed within the concatenated [AB] domain in a head-initial relation, as a lexical accent dominates a derived accent. I show this below with original diagrams extrapolating on the discussion and proposals put forth in Yoshida Y. (1999).

(37) Structure of /námida-ga/ [námidaga] ‘tears-NOM’



In the above word, the accent of [námida] ‘tears’ is retained as it is a lexical accent, with /-ga/ ‘NOM’ being the licensee in the final structure. In all cases of morphologically complex Analytic domains, the process of accent assignment is simple: licensing structure is projected where necessary, licensing relations contract between unlicensed nuclei or their projections, and further concatenation occurs until only one unlicensed nucleus remains. There is no ordered list of accent assignment rules, but simply one set of parameters regarding the creation of derived licensing structures (cf. (19)) and relations between lexical and derived structures (the Lexical Marking Principle). Let us now consider Analytic Noun-Noun compounds in the next section before considering Accented particles in 5.5.5.

5.5.3 Japanese Noun-Noun Analytic Compounds

In Standard Japanese, Yoshida Y (1999) proposes that Analytic nominal compounds such as [[náma][tamágo]] or [namatamágo] 'raw egg' are of the shape [[A][B]]. This is identical to the shape of a compound such as [[bláck][bóard]] realised as [bláckbòard], discussed by Kaye (1995). Note that English compounds retain the left domain stress as the primary stress and resolves a clash in accent by demoting the stress of the right-hand domain to secondary stress, with Yoshida S. noting that the dominant domain is the left domain in English. The right domain accent is retained in Japanese, as we see shortly, and the left-hand domain's accent is deleted rather than demoted.[20] Yoshida Y. claims the right-hand member of a compound determines the pitch accent of the resultant compound, following the right-hand head proposal of Williams (1981).[21] Consider the structure of analytic compounds below in (38).

(38) **Tokyo Analytic Compounds** (Yoshida Y. 1999:134-136)

a.	_		*		*
	[ta ke]	+	[ha si]	>	[ta ke ba si][22]
	'bamboo'		'chopsticks'		'bamboo chop sticks'
b.	*		*		(*) *
	[a ta ma]	+	[ka zu]	>	[a ta ma ka zu]
	'head'		'number'		'head count'
c.	_		*		*
	[sa sa]	+	[mi do ri]	>	[sa sa mi do ri]
	'bamboo grass'		'green'		'bamboo grass green'
d.	*		*		(*) *
	[na ma]	+	[ta ma go]	>	[na ma ta ma go]
	'raw'		'egg'		'raw egg'

[20] One might ask whether high tone spreading simply masks the accent of the left-hand term of the compound. I point out that Yoshida Y. captures the accent clash as deletion, shown in cases where the left-hand term is initially accented and this accent is deleted in the resultant compound.

[21] See Yoshida Y. (1999:134-146) for further discussion of morphology and compositionality of more complex compound words.

[22] Some compounds exhibit *rendaku* or 'sequential voicing' where voiceless initial consonants {k, s, t, h} are realised as their voiced counterparts {g, z, d, b} upon compounding if no voiced consonant is found in the right-hand term, as discussed in Chapter 1. I refer the reader to works such as Itō & Mester (1986), Nasukawa (2000) and Labrune (2012) for further discussion of this phenomenon.

e.

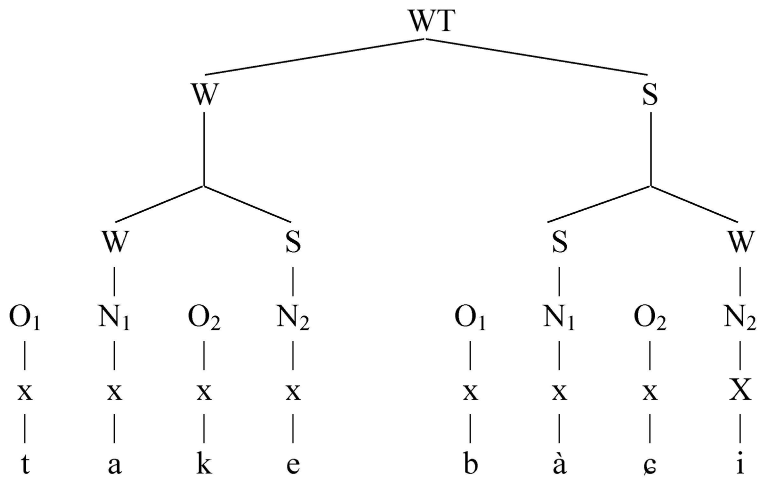
[ka ni]	+	[ta ma go]	>	[ka ni ta ma go]
‘crab’		‘egg’		‘crab omelette’

f.

[u zu ra]	+	[ta ma go]	>	[u zu ra ta ma go]
‘quail’		‘egg’		‘quail omelette’

Above, the resultant compound in the right column retains the accent pattern of the right-hand term of the input. This accent dominates both accented and unaccented left-hand terms, seen in the first column. Yoshida Y. (1999) proposes that Japanese analytic nominal compounds have the domain shape of [[A][B]].[23] The accented [B] domain determines the accent of the resultant [AB] domain, and is the head of the compound [[A][B]]. While the lexical accent would be the head of each term in isolation, there is a conflict between the two terms within the concatenated [noun-noun] domain that must be resolved. Only one head is permitted per word. In English, such a conflict would be resolved by making one of the stresses secondary, as in *bóokshèlf*. However, no secondary accents are possible in Tokyo Japanese pitch accent and thus no trace of the [A] domain accent remains. The head of domain [A] is licensed in the final structure and loses its position as a head, and its status as the accented nucleus. I show the licensing structure of the compound [[take][hàɕi]] or [takebàɕi] ‘bamboo chopsticks’ below. I derive the below licensing structure based on the proposed principles.

(39) The licensing structure of [takebàɕi] ‘raw bamboo chopsticks’



[23] It is unclear what happens in a noun-noun compound if both terms are unaccented or if the right-hand term is unaccented, as Yoshida Y. provides no examples. De-accenting morphemes such as [teki], discussed by McCawley (1965:198), could provide one example. He provides the example [ho:genteki] ‘dialectal’, which I note is composed of the terms [ho:gén] ‘dialect’ and [teki] ‘-ish, -al’. The domain structure of the compound would be [[ho:gén][teki]], with the accent pattern of domain B retained in the final output. See also potential examples in Okuda (1971).

5.5.4 Japanese Non-Analytic compounds

Note that not all words which seem to be compounds have the same accent assignment pattern, as seen in analytic compounds. These are assigned non-analytic status by Yoshida Y. Accent of the right-hand term is not retained in these words and they are assigned accent like a simplex word of four or more nuclei, e.g. [murásaki] 'violet'. Consider the following compounds in (42a-f), drawn from Yoshida Y. (1999:98).

(40) **Non-analytic compounds in Tokyo Japanese** Yoshida Y. (1999:98)

a. [ha na] + [kata] > [ha na ga ta]
'flower' 'shape' 'star/celebrity'

b. [u ɕi ro] + [a ɕi] > [u ɕi ro a ɕi]
'behind' 'leg' 'hind legs'

c. [ya ma] + [mi tɕi] > [ya ma mi tɕi]
'mountain' 'street' 'mountain foot path'

d. [sa ku ra] + [mi tɕi] > [sa ku ra mi tɕi]
'cherry tree' 'street' 'cherry tree road'

e. [hage] + [a ta ma] > [ha ge a ta ma]
'baldness' 'head' 'bald head'

f. [u mi] + [tsu ba me] > [u mi tsu ba me]
'sea' 'swallow' '(stormy) petrel'

In the above words, preservation of the [B] domain accent as seen in analytic compounds in (38) is absent. Antepenultimate accent is found in all resulting compounds, noted with a circumflex. Yoshida Y. notes that antepenultimate accent found here is identical to the antepenultimate accent found in simple Japanese words longer than three nuclei, e.g. [murásaki] or [hototógisu] 'cuckoo'. She thus proposes that these forms are Non-Analytic words of the shape [AB], with no morphological boundary visible to phonology. If these words were analytic, the accent of the right hand term would be retained in the surface form. These 'compounds' are not treated as words formed of two domains with regards to phonology. Now let us consider the case of accented particles.

5.5.5 Nouns and accented particles

I now examine the case of accented particles such as /nó/ 'GEN', /gúrai/ 'as much as, to the extent' and /made/ 'as far as', which behave in a different manner than accentless particles such as /-ga/ 'NOM'. To account for the accent patterns here, I propose that not all particles behave as dependent domains e.g. [[noun]particle]. Traditionally, accented particles are analysed as occurring in two forms. McCawley (1968, 1977) as well as Poser (1984), Nishiyama (2010) and Labrune (2012) among others have placed accented particles in the classes of predominating (or dominant) and yielding (or recessive) particles. Predominant accented particles retain their accent when attached to both accented and unaccented nouns. A yielding suffix is accented, but this accent is only retained when suffixed to an unaccented word. If suffixed to an accented word, the yielding suffix's accent is lost. Some particles also have the effect of 'pre-accenting', or accenting the mora or syllable preceding the suffix. I discuss the case of pre-accenting particles briefly in the next chapter. Other restricted classes of particles are discussed in Kawahara (2015) and not touched upon here. Consider the data below exemplifying the behaviour of predominating and yielding particles.

(41) Dominant accented particle with /gúrai/ 'as much as' (McCawley 1968:140)

Noun	Noun + /gúrai/	
/ínotɕi/	[inotɕigúrai]	'life'
/kokóro/	[kokorogúrai	'heart'
/atamá/	[atamagúrai]	'head'
/mijako/	[mijakogúrai]	'capital'

(42) Yielding accented particle with /máde/ ‘as far as’ (McCawley 1968:139)

Noun	Noun + /máde/	
/ínotɕi/	[ínotɕimade]	‘life’
/kokóro/	[kokóromade]	‘heart’
/atamá/	[atamámade]	‘head’
/mijako/	[mijakomáde]	‘temple’

5.5.6 Genitive /-no/ as an analytic and dependent accented suffix

Yoshida Y. (1999:151) has previously proposed that the genitive suffix /-nó/ is an accented suffix. She proposes that accented suffixes are dependent analytic suffixes, giving a suffixed noun the domain shape of [[A]B] or [[noun]particle], as with nominative particles. The difference is in the result seen with unaccented nouns. I briefly show an example of the genitive form of /námida/ ‘tear’ and the accentless word /kuruma/ derived below.

(43) Genitive particle /nó/ as a dependent domain [[noun]particle]

		*		*
a. [[ku ru ma]	+	no]	>	[ku ru ma no]
‘car’		‘GEN’		
*		*		*
b. [[na mi da]	+	ma de]	>	[ku ru ma no]
‘tears’		‘GEN’		

The genitive form of the accentless noun /kuruma/ ‘car’ retains the genitive particle’s accent, seen in (43a). However, its accent is not realised in the genitive of initially accented /námida/ ‘tears’, giving surface [námidano] ‘tears-GEN’ in (43b). I exclude discussion of deaccentuation here, which Yoshida Y. (1999) proposes is accent class resolution and which I have discussed previously.

5.5.7 The structure of yielding accented particles

I propose that yielding accented particles or suffixes discussed by McCawley (1968) and Nishiyama (2010) like [máde] ‘as far as’ are in fact dependent analytic domains, just like the structure assigned to the genitive particle /nó/. Consider the following data, drawn from Nishiyama (2010), with the proposed domains applied.

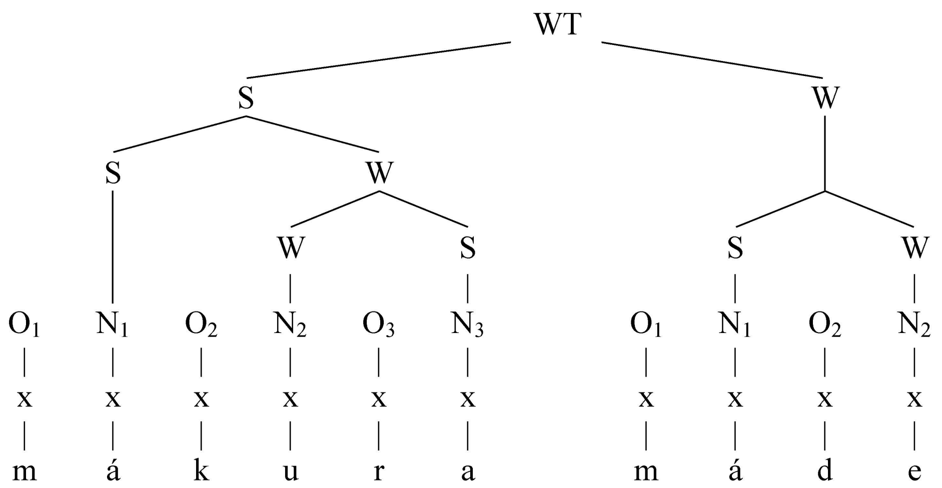
(44) Yielding accented particle [máde] as a dependent domain or [[noun]particle]

a. [[sa ka na]	+	ma de]	>	[sa ka na ma de]
‘fish’		‘as far as’		
b. [[ma ku ra]	+	ma de]	>	[ma ku ra ma de]
‘pillow’		‘as far as’		

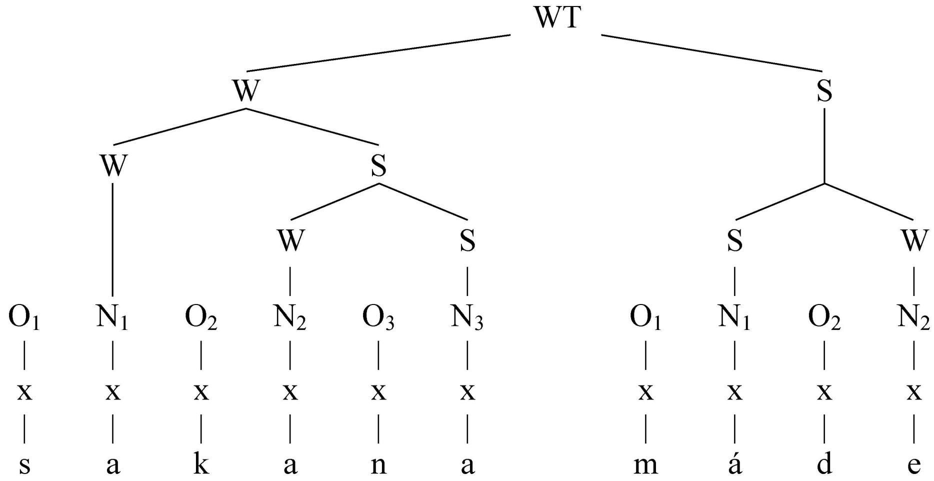
Above, the accent in noun domain [A] is retained if it is accented, as with [mákuramade] ‘pillow-as far as’. The noun’s lexical accent overrides the suffix accent in the dependent domain. This is a result of the manner in which domain structure is computed, with the lexical head in the first domain [A] licensing the lexical head of an accented suffix in the second domain [AB] due to a conflict between two lexical accented. The [A] domain’s accent is computed prior to that introduced in the [AB] domain and thus is retain.

The particle’s accent is realised, however, when [A] is an unaccented word. Recall that an unaccented word such as /sakana/ ‘fish’ has no underlying accent, and accentless domains are interpreted as having domain-final accent. The suffix /máde/ ‘as far as’ is lexically accented. Following the Lexical Marking Principle proposed by Yoshida Y, a lexically marked accent must not itself be licensed, while a nucleus which is a derived head may itself be licensed. Thus the lexically assigned suffix accent in /máde/ licenses the foot structure created previously in domain [A], in [sakana] ‘fish’ in the domain [AB], with the final accent pattern being [sakanamáde] ‘fish-as far as’. I show these two structures below.

(45) The structure of [[mákura]máde], giving [mákuramade] ‘pillow-as far as’



(46) Structure of [[sakana]máde], giving [sakanamáde] ‘fish-as far as’



5.5.8 The structure of predominating particles

McCawley (1968) and Nishiyama (2010) also note the existence of predominating accented particles, such as [gúrai] ‘to the extent’. A predominating particle is an accented particle that retains its accent regardless of the accented or unaccented status of the preceding word. I account for this by proposing that predominating suffixes behave as independent analytic domains, forming words of the shape [[noun][suffix]]. In this way, nouns with a predominating suffix behave in the exact same way as analytic noun-noun compounds discussed above. Now consider the same nouns in (47), suffixed with the predominating particle [gúrai] ‘to the extent’.

(47) Dominant accented particle [gúrai] as an independent domain or [[noun][particle]]

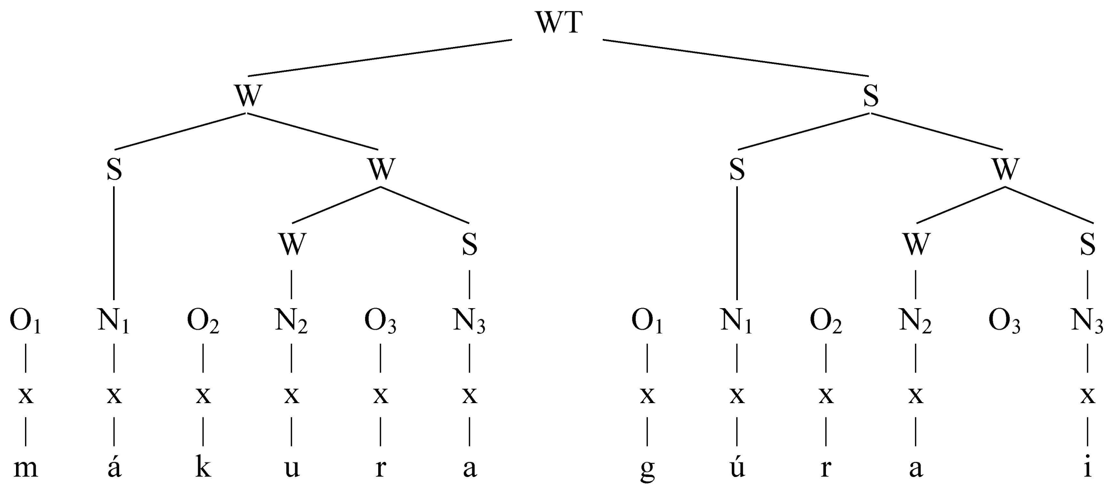
a. [[sa ka na] ‘fish’	+	[gu* ra i]] ‘to the extent’	>	[sa ka na gu* ra i]
b. [[ma* ku ra] ‘pillow’	+	[gu* ra i]] ‘to the extent’	>	[ma(*) ku ra gu* ra i]

The accent of this suffix is retained in the final word, regardless of whether the noun in domain [A] is accented or not. Phonology assesses [A] and [B] and the domains are concatenated. Two lexical heads are projected to the resultant domain [AB], giving rise to the domain [mákuragúrai]. This violates the Licensing Principle; recall that Japanese does not allow for secondary accent. This same proposal accounts for the accent patterns of compounds below, which have the shape [[A][B]] and which Yoshida Y.

assumes are an instantiation of the right-hand head rule. Assuming the dominance of the [B] term, the surface form is [makuragúrai]. With regards to [sakanagúrai], the resulting accent is identical. The only difference here is that no lexical accent is deleted from the [A] domain as no lexical accent is present and the accent of [B] is retained; the derived and unlicensed head of domain [A] is itself licensed in domain [AB] as the [B] domain's lexical accent is dominant over the derived [A] domain accent.

Consider the licensing structure I propose below, similar to what Yoshida Y. proposed above for the noun-noun compound [namatamágo] 'raw egg'. The licensing relations between [mákura] 'pillow' and the particle [gúrai] 'to the extent of' is presented with the head of the particle being the overall head of the domain.

(48) Structure of [makuragúrai] 'pillow-to the extent of'



5.6 Conclusion

In this chapter, I have introduced the GP account of Japanese accent from Yoshida Y. (1999). She proposes that Japanese syllables are in fact composed of strictly repeating onset-nucleus pairs with no branching constituents and no syllable position. Under this view, the unit of accent assignment is the nucleus, not the mora. To account for accent patterns, Yoshida Y. claims that licensing relations between nuclei, typically captured through the use of a metrical foot. This aligns pitch accent assignment with stress assignment. Yoshida Y. claims further that pitch accent is the interpretation of high pitch on the head nucleus derived through foot formation, and Low tone is unspecified in the phonology, with low pitch being the interpretation of an accentless nucleus. I have proposed that the head of a word is in fact assigned a High tone, with Tokyo Japanese being one example of a privative tone system. This is crucial to account for tone or pitch spreading in Chapter 8, where I show that it is sensitive to syllable structure. A small discussion of initial syllable structure is also presented.

With regards to licensing structure, Yoshida Y. argues that the building of relations between nuclei gives rise to the default accent pattern of words. The unlicensed head of a domain is the accented nucleus. In simplex words containing four or more, nuclei, antepenultimate accent is accounted for by positing a right-headed binary foot built from the right edge. The head of the penultimate foot gives antepenultimate accent. In shorter words, Yoshida claims that 'unaccented words' are in fact given a derived final accent. The inability of a penultimate foot to form gives all unaccented words a final surface accent. Furthermore, accented words have their head nucleus specified in the lexicon. I extended the foot structures proposed by Yoshida and presented full proposals for initial, medial and final accented words.

To account for the assignment of accent in morphologically complex words, Yoshida Y. proposes that a lexical accent dominates a derived accent (the Lexical Marking Principle) and uses the theory of Analytic and Non-Analytic domains (Kaye 1995) to account for certain noun-noun compounds. The Principle of Strict Cyclicity and the proposed Lexical Marking Principle are used to account for retention of lexical accent. A division is made between true noun-noun compounds, with two phonological domains, and non-analytic words, where morphological boundaries are not visible to the phonology. Discussion of the structure of noun plus suffix was also discussed. I concluded with a further investigation of accented particles of dominating and yielding types, further extending the proposed principles to account for the behaviour of yielding and dominant particles.

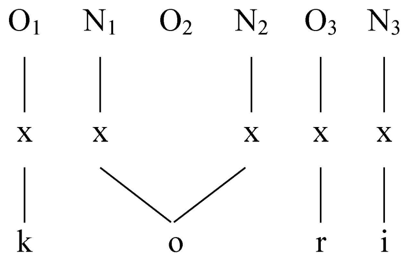
What is left now is to discuss how 'special moras' are redefined within this framework. I turn to this issue in the next chapter, where I show that the representations proposed by Yoshida Y. (1999) and Yoshida S. (1996, 2003) must be re-assessed. I further claim that even marginal facts of Standard Japanese examined above from Labrune (2012a), such as accentuation of /N/ in certain circumstances, can be accounted for through new structures and parameters on projection for licensing structures using the abovementioned proposals.

Chapter 6: The structure of words with ‘special moras’

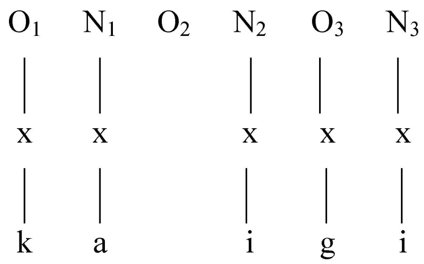
In this chapter, I aim to propose a syllable-free solution for three issues related to the representation of words containing special moras. I first aim to refine the process of accent assignment without referring to the syllable. Secondly, I aim to present revise the structures of syllables containing a moraic nasal, long vowel or diphthong from those presented in the Standard GP literature. Three, I aim to redefine the notion of a special mora. I propose that so-called 'special moras’ {R, J, N, Q} are in fact unified as onset-nucleus (later, CV) pairs and their ‘deficiency’ is related to the status of the nucleus found within. Let us first examine the target Standard Government Phonology representations of words containing ‘special moras’ drawn from Yoshida Y. (1999), shown in (1). Note that these are underlying forms.

(1) Preliminary representation of ‘special mora’ structures

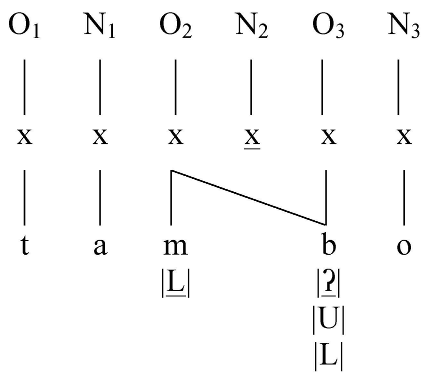
a. Underlying representation of a long vowel as in [ko:ri] ‘ice’



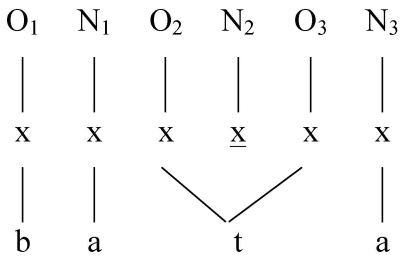
b. Diphthong as in [kaigi] ‘meeting’



c. Nasal-obstruent cluster as in [tambo] ‘paddyfield’, assimilation shown



d. Geminate as in [bat:a] 'grasshopper'



Above, a long vowel is underlyingly formed of one segment associated to two nuclei. A diphthong is formed of two adjacent nuclei. These nuclear positions surround an empty onset. A geminate is formed from one segment associated to two onsets, while a nasal-onset cluster consists of a homorganic nasal onset followed by an obstruent. An empty nucleus is present between the two onset positions of a geminate and a nasal-obstruent cluster.

Reconsider briefly the pitch-spread patterns noted by Yoshida Y., which are one of the motivations for the proposed representation. (Recall that I term this pattern Tokyo Pattern A; I discuss Pattern B in Chapter 8.) Pitch spreads from the domain-final nucleus until the initial nucleus in Tokyo Japanese in both accented and unaccented words. The below data consist of unaccented words in which the initial nucleus is part of a so-called 'bimoraic' syllable.

(2) Unaccented words with spread until the initial nucleus (Yoshida Y. 1999)

a. Words containing diphthong, geminate, long vowel or nasal-stop cluster

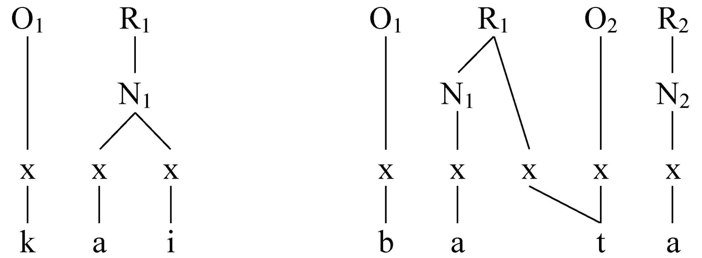
[ko o ri]	'ice'
[bjo o ki]	'illness, sick'
[ka i te]	'buyer'
[to i si]	'whetstone
[ba t ta]	'grasshopper
[ke ŋ ka]	'quarrel'

b. Words with only CV 'syllables'

[sa ku ra]	'cherry tree'
[ku ru ma]	'car'

In the GP representations proposed here, there is no structure unifying the initial and following nucleus. This accounts for the independence of the initial nucleus with regards to pitch spread, as no syllable or rhyme unifies the initial nucleus with the following segment.[1] As I have pointed out in the previous chapter, the above data cannot be accounted for when the syllable is utilised as a constituent. Furthermore, Yoshida Y. also notes that this data is not accommodated under any framework utilising the branching rhyme or nucleus, with sample representations shown below.

(3) Branching nucleus and rhyme shown in [kai] 'claim' and [bat:a] 'grasshopper'



One analytic goal for this chapter is addressing how a GP analysis accounts for accent shift, which formerly required the use of the syllable as the unit of accent interpretation or alternative branching constituents. No syllable is utilised in a GP approach, and Yoshida Y. (1999) eschews the use of branching constituents while claiming that Japanese is a non-branching language. Consider the following non-analytic words in (4) and (5), exhibiting words with a typical antepenultimate accent. The words in (4) are recalled from the previous chapter. The words in (5) represent words with 'special moras' in the ultimate or penultimate positions.

(4) Non-analytic words w/antepenultimate accent

a. [ka i gi] + [ɕi tsu] > [ka i gi ɕi tsu]

'meeting' 'room' 'meeting room'

b. [ni N ki] + [ka bu] > [ni N ki ka bu]

'popularity' 'stock' 'popular stock'

[1] It also accounts for the ability of a nasal and a geminate to be perceived as having high pitch, as there is a nucleus present.

c. *

[ge N go] + [gaku] > [ge N go ga ku]

^

'language' 'study' 'linguistics

d.

[sa ku ra] + [mi tɕi] > [sa ku ra mi tɕi]

^

'cherry tree' 'street' 'cherry tree road'

e. * *

[hage] + [a ta ma] > [ha ge a ta ma]

^

'baldness' 'head' 'bald head'

f. *

[u mi] + [tsu ba me] > [u mi tsu ba me]

^

'sea' 'swallow' '(stormy) petrel'

(5) Non-analytic words w/antepenultimate accent, including 'special moras'[2]

a.

[to no sa ma] + [ba t ta] > [to no sa ma ba t ta]

^

'daimyo, feudal lord' 'grasshopper' 'locust'

b.

[ki tsu ne] + [u do N] > [ki tsu ne u do N]!

^

'fox' 'udon noodles' 'udon topped with fried tofu'

c. *

[tɕi ki N] + [ka re e] > [tɕi ki N ka re e]!

^

'chicken' 'curry' 'chicken curry'

d. * *

[ju ki] + [o N na] > [ju ki o N na]!

^

'snow' 'woman' 'snow fairy'

The existence of a geminate, long vowel, diphthong or syllabic nasal in the penultimate or ultimate onset-nucleus pair does not affect accent assignment. The proposed representations from Yoshida Y. unify the above words as non-analytic words with accent on the antepenultimate nucleus. Consider the structures of /jukioN_na/ [jukióNna] 'snow fairy' and /umitsubame/ [umitsúbame] 'stormy petrel'.

[2] I add the accent patterns from NHK (2012) for the two morphemes from which [tonosamabatta] 'locust' is built. The data in (5) are attested in Poser (1990) and discussed by Yoshida Y. (1999:48,55).

(6) Representation of [umitsúbame] ‘stormy petrel’

O1	N1	O2	N2	O3	**N3**	O4	N4	O5	N5
	|	|	|	|	|	|	|	|	|
	x	x	x	x	**x**	x	x	x	x
	|	|	|	|	|	|	|	|	|
	u	m	i	ts	**ú**	b	a	m	e

(7) Representation of [jukióNna] ‘snow fairy’

O1	N1	O2	N2	O3	**N3**	O4	N4	O5	N5
|	|	|	|		|	|	|	|	|
x	x	x	x		**x**	x	x̲	x	x
|	|	|	|		|	|		|	|
j	u	k	i		**ó**	N		n	a

Now consider words exhibiting accent shift shown in (8), which was discussed in chapter 1 with exemplification of loanwords. Pre-antepenultimate accent is found in each of the below non-analytic words.

(8) Non-analytic words with pre-antepenultimate accent (Yoshida Y. 1999:101,113,123)

a.	[e N so o]	+ [ɕi tsu] (*)	> [e N so o ɕi tsu] (^ under o)
	‘music performance’	‘room’	‘music room’
b.	[gi N ko o]	+ [ka bu]	> [gi N ko o ka bu] (^ under o)
	‘bank’	‘stock’	‘bank stock’
c.	[ɕa ka i] (*)	+ [ga ku] (*)	> [ɕa ka i ga ku] (^ under i)
	‘society’	‘study’	‘sociology’
d.	[ko N] (*)	+ [ka i] (*)	> [ko N ka i] (^ under N)
	‘this’	‘time’	‘this time’
e.	[ge N go] (*)	+ [ga k ka i][3]	> [ge N go ga k_ ka i] (^ under ga)
	‘language’	‘conference’	‘linguistics conference’

[3] I draw the pitch accent pattern for [gakkai] in isolation from the NHK (2012) and OJAD (2015).

The non-analytic words in (8) exhibit the shift of accent to the pre-antepenultimate nucleus. This is traditionally treated as the assignment of accent to the antepenultimate mora, which is then interpreted on the head nucleus of the syllable (cf. McCawley 1968, Kawahara 2015). In an onset-nucleus based representation, the accent site in the above words is the pre-antepenultimate nucleus.

Considering the above representations, the antepenultimate nucleus is an inappropriate site for accent as it is empty in a geminate or nasal-obstruent cluster or as it is the second nucleus of a diphthong or long vowel. To fully account for the problematic antepenultimate positions above, we must first examine the proposal that certain (empty) nuclei do not project, and examine the ECP, which regulates the ability of these nuclei to remain silent or be phonetically interpreted.

6.1 Unaccentable positions as governed nuclei

Yoshida Y. (1999) proposes that the reason for accent shift affecting the nucleus in geminates and syllabic nasals is that the nucleus found between the onset positions is empty and governed and thus cannot project. If nuclei do not project, they cannot form part of the licensing (or foot) structure in a word domain. I discuss government of empty categories in the following section. In short, government is a type of licensing which silences an empty position and allows it to remain uninterpreted.[4] Long vowels and diphthongs also contain a governing relation, but here it is a relation found between two nuclei. The relation between nuclei is discussed in 6.4.

6.1.1 Restricting empty positions: the Empty Category Principle

Empty positions in GP exist in the form of empty onsets and empty nuclei, and their silence is regulated through the phonological Empty Category Principle. The presence of empty nuclear positions is easily detected in languages that have a process of vowel-zero alternation, such as French, Turkish or Arabic. Any alternating site is analysed as an empty nucleus, as operations of epenthesis or syncope amount to insertion or deletion of a position and violate the Projection Principle. Empty nuclei do not always alternate in some languages, such as Japanese. In Japanese, the existence of empty nuclei is betrayed by the ability of empty nuclei to bear high pitch under spread and their visibility with regards to accent assignment, as seen in [jukióNna] ‘snow fairy’. Before considering Japanese, let us first discuss the theory in further detail.

[4] Note that government and licensing are defined differently in Strict CV; see below and Szigetvári (2013) for more.

To regulate the phonetic interpretation of empty positions, Kaye, Lowenstamm & Vergnaud (1990) propose the phonological Empty Category Principle (ECP). This principle regulates the non-interpretation (or silence) of empty positions. The ECP is defined as follows. I present an updated version of the ECP from Kaye (1995).

(9) **The Phonological ECP** (Kaye 1995:295)

A p-licensed (empty) category receives no phonetic interpretation.

P-licensing:

1. Domain-final (empty) categories are p-licensed (parameterised).
2. Properly governed (empty) nuclei are p-licensed.
3. A nucleus within an inter-onset domain is p-licensed.

If the ECP is satisfied through one of the above conditions, an empty position may remain silent and uninterpreted. An empty and uninterpreted nucleus is considered p-licensed, or prosodically licensed. If the ECP fails to be satisfied, the empty nucleus fails to be p-licensed and must receive an interpretation. The interpretation of an empty nucleus or onset differs depending on the language. One example is the realisation of an empty nucleus as [ɨ] in Moroccan Arabic, discussed shortly.

Condition 1 of the ECP refers to the allowance of domain-final empty nuclei (Kaye 1990a). Domain-final empty nuclei are licensed by a parameter that regulates the existence of final empty positions, while domain-medial empty nuclei are p-licensed through proper government and onset-to-onset government.[5] Condition 2 refers to proper government, which is dispensed from a nucleus regressively to a preceding empty onset or nuclear position (Charette 1991). Condition 3 refers to onset-to-onset government, which is a governing relation holding between two onsets. This is relevant for the representation of Japanese geminates proposed by Yoshida Y. (1999). This is known in the literature as onset-to-onset government (Gussmann & Kaye 1993) or inter-onset government (Cyran 2010). An extended version of the ECP within Standard GP is found in Kula (2002) and a revision of the ECP and revised views of government within the framework of Strict CV are found in Scheer (2004, 2012). I discuss and introduce Strict CV briefly in 6.5. I now examine each condition briefly in turn, beginning with the parameter allowing domain-final empty nuclei.

[5] Scheer (2004:67) assumes another version of the ECP, which utilises Infra-segmental government to account for branching onsets or TR clusters. See also Cyran (2010) for an expanded implementation of onset-to-onset government.

6.1.1.1 Condition 1 of the ECP: Domain-final empty nuclei

The p-licensing of a domain-final empty nucleus is regulated by a parameter in condition 1 of the ECP. Words with domain-final consonants as English [kæt] 'cat' are analysed in GP as having an empty nucleus in the domain-final position (Kaye 1990a).[6] The domain-final parameter allowing final empty nuclei is in the [ON] position in languages which have word-final consonants such as English, French, Icelandic, Wolof and many others (Kaye 1990a, Charette 1991, Harris & Gussmann 1998, 2002; Scheer 2004). Japanese has no word-final consonants and thus under this view does not permit empty nuclei domain finally, and the parameter is claimed to be in the [OFF] position (Yoshida Y. 1999, Yoshida S. 1996).[7] Compare the structure of English [kæt] 'cat' and Japanese [kata] 'person' below, with a domain-final p-licensed empty nucleus underlined.

(10) Representation of English [kæt] 'cat' and Japanese [kata] 'person'

a. English [kæt] 'cat'

$$\begin{array}{cccc} O_1 & N_1 & O_2 & \underline{N_2} \\ | & | & | & | \\ x & x & x & \underline{x} \\ | & | & | & \\ k & \text{æ} & t & \end{array}$$

b. Japanese [kata] 'person'

$$\begin{array}{cccc} O_1 & N_1 & O_2 & N_2 \\ | & | & | & | \\ x & x & x & x \\ | & | & | & | \\ k & a & t & a \end{array}$$

In the English word [kæt], the domain-final nucleus position is empty. The analysis of a domain-final consonant as an onset and not a coda is supported by a lack of vowel length restrictions preceding the domain-final consonant in languages like

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[6] Scheer analyses the domain-final parameter as government originating from the domain or phase (Scheer 2004, 2012). Regardless of how one interprets the force which silences the domain-final empty nucleus, languages either do or do not allow a domain-final empty nucleus.

[7] The syllabic nasal is not a consonant domain-final finally, discussed below.

English, French and Wolof (Kaye 1990a:304ff).[8] Only a short vowel would otherwise be expected preceding a coda. Kaye (1990a) proposes that a word-final consonant is an onset followed by an empty nucleus, with this empty nucleus regulated by parameter. In English, the final empty nucleus is p-licensed by the domain-final parameter of the ECP, with the parameter turned [ON]. In Japanese, this parameter is [OFF] and no domain-final empty positions are permitted. This is clearest when examining loanword adaptation, where loanword inputs that have a domain-final consonant have an epenthetic vowel domain-finally, e.g. [be:subo:ru] 'baseball'.

I now move onto the discussion of domain-medial empty nuclei.[9] Within a GP analysis, there are two options available for satisfaction of the ECP with regards to domain-internal empty positions: proper government and inter-nuclear or inter-onset government.

6.1.1.2 Condition 2 of the ECP: Proper Government

Proper government (PG) p-licenses a domain-medial position and holds between a nucleus and a preceding empty nucleus or onset. PG is required to allow empty positions to remain phonetically uninterpreted. Proper Government has been applied to vowel-zero alternations in Moroccan Arabic (Kaye 1990b), French (Charette 1991), Polish (Gussmann & Kaye 1993, Cyran 2010) and Czech (Scheer 2004) among many other languages. I present the definition of Proper Government below.

(11) **Proper Government** (Kaye 1995:295)

α properly governs β if and only if:

1. α and β are adjacent on the relevant projection
2. α is not itself p-licensed and
3. no governing domain separates α from β

The nucleus and its governee must be adjacent either within the same onset-nucleus pair or may be adjacent at the nuclear projection. Empty nuclei project in order to find a governor, though their visibility for stress or accent assignment is parameterised in a recent proposal from Scheer & Szigetvári (2005). I discuss the non-projection of empty nuclei for Japanese below, building on the proposal from Yoshida

[8] Kaye (1990a:311) further proposes the principle of Coda Licensing in which a 'coda', or rhymal complement, must be licensed by a following onset. This accounts for the strict melodic profile found in coda-onset sequences. As Japanese does not have branching rhymes, I do not discuss this principle further.

[9] See Kaye (1992), Lowenstamm (1999) and Scheer (2012) for discussion of domain-initial empty categories.

Y. (1999) that empty nuclei do not project. PG fails in certain circumstances if any of the above conditions are not met, most commonly due to the potential proper governor being itself p-licensed. When an empty position is not properly governed, it must receive a phonetic interpretation. Failure of PG receives further discussion in Charette (1990, 1991) within Standard GP, and Scheer (2004) and Cyran (2010) within Strict CV.

6.1.1.3 Proper Government exemplified: Moroccan Arabic

I now discuss the application of proper government briefly with relation to Moroccan Arabic. Consider the verbal forms in Moroccan Arabic from Kaye (1990b) below, in which proper government (PG) is active and applies regressively within a domain[10]. According to Kaye, Moroccan Arabic has three standard vowels, [a, i, u] and one epenthetic vowel, [ɨ].[11] Kaye posits the existence of an empty nucleus in positions where dynamic alternations are found, with an empty nucleus realised as [ɨ] when PG fails. Consider the first person singular and plural verb forms below. PG is represented by a solid arrow and failure of PG represented by a strikethrough. P-licensed positions are underlined, with phonetically interpreted empty positions realised as [ɨ].

(12) Moroccan Arabic verbal alternations (Kaye 1990b)

a. [tan ktɨb] 'I write'

O_1	$\underline{N}_1$	O_2	N_2	O_3	$\underline{N}_3$
|	|	|	|	|	|
x	$\underline{x}$	x	x	x	$\underline{x}$
|		|		|	
k		t	[ɨ]	b	

[10] I note that PG applies regressively in most proposals, though it has been argued to apply progressively by Polgardi (1998) and Rowicka (1999). See Charette (1991) and Scheer (2004) among others for discussions of PG and directionality.

[11] I abstract away from issues of vowel length in this section, as it is not crucial to the discussion. For further review of vowel length in some Arabic varieties from the GP point of view, see Fathi (2014).

b. [tan kɨtbu] ‘We write’

O_1	N_1	O_2	$\underline{N}_2$	O_3	N_3
|	|	|	|	|	|
x	x	x	$\underline{x}$	x	x
|		|		|	|
k	[ɨ]	t		b	u

Consider the representation of [ktɨb] ‘I write’ in (12a). N_3 is first p-licensed by the domain-final parameter, which is [ON] in Moroccan Arabic. As N_3 is p-licensed, it is not a good proper governor and N_2 cannot be properly governed. N_2 receives a phonetic interpretation. N_2, failing to be p-licensed by N_3 can then act as a proper governor for N_1. In (12b) [kɨtbu] ‘We write’, the plural suffix [u] fills the domain-final nuclear position. The final nucleus, being lexically filled and being ungoverned, can properly govern the preceding nucleus, N_2. N_2 is now p-licensed and is not a potential proper governor. The empty nucleus in N_1 fails to be p-licensed and receives a phonetic interpretation, as [ɨ].

6.1.1.4 ‘Anything goes’ surrounding a properly governed empty nucleus

One clear effect of PG is that the consonants flanking an empty nucleus show no phonotactic restrictions. This is in contrast to onsets in an inter-onset governing relation, on which more below, which exhibit strict phonotactic effects. Consider the following data from Scheer (2012:250), where Moroccan Arabic shows any combination of obstruent and sonorant (TR) and its reverse (RT) word-initially, which he terms an ‘anything goes’ situation. [12]

---

[12] Unlike Japanese pitch accent spreading, Moroccan Arabic does not show any protection of the initial-nucleus. See Kaye (1990b) and Scheer (2004, 2012) for more on Moroccan Arabic and PG.

(13) Moroccan Arabic Initial Clusters (Scheer 2012:250)[13]

$\#C_1C_2$	$\#C_2C_1$	Gloss
brɨd	rbɨṭ	to freeze, to tie
ḍrɨb	rḍa	to hit, to accept/bless
glɨʕ	lga	to take away, to find
bka	kbɨr	to cry, to become big
nzɨl	zna	to go down, to commit adultery
dna	ndɨm	to approach, to regret
bqa	qbɨl	to stay, to accept

In the above words, the initial consonant clusters are created through proper government, with a governed empty nucleus present following the first consonant. Such clusters are considered to be bogus clusters in the literature, as there is no true relation between these positions and accordingly no phonotactic relationship between the two onsets. The same observation is made for certain clusters in English (Harris 1994), Polish (Cyran 2010) and French (Charette 1991:76ff) as well as dialects of Greek and certain Slavic languages discussed by Scheer (2004, 2012).

6.1.1.5 Proper Government in Japanese, or a lack thereof

One naturally questions whether proper government effects are seen in Japanese. If proper government were active in Japanese, the language would display vowel-zero alternations and/or consonant clusters with no clear complexity profile, as in French and Arabic discussed earlier. Vowel devoicing is one process where proper government could be active, which operates between two voiceless consonants or a voiceless consonant and the end of a word, giving rise to apparent clusters in words like [futsu̥ka] 'second of the month'. This is a tempting foundation for the existence of proper government in Japanese. However, the accentability of a devoiced vowel is a possibility for some speakers (cf. Kawahara 2015) and there is much debate on the representation and phonological nature of the devoiced vowel (cf. Kondo 1997, 2005 and Hirayama 2009 for recent discussion focusing on devoicing). The argument that devoiced vowels are the target of onset-to-onset government is found in Yoshida S. (1996) and Yoshida Y. (1999). Based on the fact that devoiced vowels are not clearly phonological, I propose (for the moment) that PG is not active in Japanese.

[13] I thank Tobias Scheer for providing a clarified gloss for [rḍa] 'to accept, bless'.

6.1.1.6 Condition 3 of the ECP: Onset-to-Onset Government

In addition to Proper Government, word-medial empty nuclei are also potentially p-licensed by a governing relation holding between two onsets, while an empty onset is also potentially p-licensed by a relation between two nuclei. These governing relations are known as inter-onset government (IOG) or inter-nuclear government (ING). Government here depends on the nature of the segments in each onset or each nucleus, with phonotactic requirements found in the nature of the onsets or nuclei which flank the empty position.

Yoshida S. (1996) and Yoshida Y. (1999) both propose that IOG p-licenses empty nuclei within a geminate or syllabic nasal-obstruent cluster. This relation can account for the inability of empty nuclei to project and receive accent in the antepenultimate position, discussed below. Yoshida Y. (1999) assumes that nuclear fusion affects the ability of a diphthong or long vowel to support accent, but I propose an alternative government-based analysis below. Consider first the conditions on IOG in below, reproduced from Cyran (2010:183).

(14) **Conditions on inter-onset government** (Cyran 2010)

a. *Melodic complexity profiles*: The governor, symbolised as (T), is melodically more complex than the governee (R).

b. *Adjacency*: the two consonants must not be separated by any melody, linked or floating.

c. *Licensing:* governing relations, just as simplex segments, require licensing from the nucleus following such a segment or relation.

Possible governing relations where an empty nucleus is found between two onsets are shown in (15), assuming the inter-onset relations proposed by Cyran (2010). Note that not all GP work assumes the same representation of a TR cluster (or branching onset) as that shown here. I only use the example below for illustration. I show inter-onset government below the skeletal-tier to clarify the difference between this and PG. In addition to PG shown in a solid line, Licensing is shown with a dotted line (on which more shortly).

The head of this cluster, O_3, is onset licensed to have segmental content by N_3 and is also government-licensed by the same nucleus. O_3 then governs O_2, with sharing of |U| producing a homorganic nasal [m]. This relation contracts in order to p-license the empty position, N_2. I discuss these relations as presented by Yoshida S. (1996) and Yoshida Y. (1999) below in 6.2, examining the structure of a geminate & 6.3, where I examine the structure of the moraic nasal N. This representation of NC clusters is also discussed for Bantu languages in Kula & Marten (1998) and Kula (1999).

As for inter-nuclear government (ING), little discussion of this is found in the literature, though such a relation is proposed in KLV (1990) and Charette (1989, 1991). A regressive nucleus-to-nucleus governing relation is used to account for umlaut in Korean by Charette (1991). In the account of Japanese long vowels and diphthongs presented in the literature, Yoshida S. (1996) and Yoshida Y. (1999) use ING government and assume a further process of nuclear fusion to account for non-accentuation of the second half of a long vowel or diphthong. Nuclear fusion is a process in which two adjacent nuclei fuse to become a branching nucleus. I claim that nuclear fusion is unnecessary to explain the accent assignment facts of Standard Japanese. I discuss the previous proposal in 6.4 and revise the proposal in section 6.5 and the following chapter.

Now that the basic aspects of the ECP, government and p-licensing have been explained, let us continue on to a review of the current Standard GP proposals for geminates, the moraic nasal and vowel sequences.

6.2 Geminates in Standard GP

Yoshida Y. represents geminates as two onset positions in a head-final onset-to-onset, or inter-onset (IOG), governing relation.[16] This supplants the representation of geminates found in Yoshida S. (1996), where some geminates are IOG sequences and some are coda-onset sequences. The structure proposed for a geminate is represented as in (17) below, as found in [bat:a] ‘grasshopper’. Government licensing is shown as a dotted line and IOG as a solid line between the onsets.

[16] This is based on previous research in an unpublished MA dissertation (Yoshida Y. 1989) and work on Sino-Japanese compounds (Yoshida S. 1996).

(19) Non-Analytic compound accent (Yoshida Y. 1999:123)

```
                *
a. [to no sa ma ba t ta]   'locust'                        (Antepenultimate)
               *
b. [ge ŋ go ga k_ ka i]    'linguistics conference'        (Pre-antepenultimate)
```

A traditional syllabic account would refer to the syllable as the site of accent assignment as a means to explain shift above. Here, I note that the pre-antepenultimate accent in (b) is an effect of the non-projection of the antepenultimate empty and governed nucleus within the geminate, represented with an underscore. In both words, the site of accent is unified as the antepenultimate projected nucleus in both words. I discuss the fuller involvement of the projected and un-projected nuclei in licensing structure later in this chapter. Now let us consider the parallel proposal for the moraic nasal.

6.3 The moraic, or syllabic, nasal N in Standard GP

The representation of N, or the moraic nasal, is slightly more complicated than that of a geminate. I first discuss the most recent GP proposal from Yoshida S. (2003), who argues that the moraic nasal, or rather syllabic nasal in his terms, is best represented as the floating nasal element, which I represent as |L|, in order to account for the variable realisation of this segment. He argues that the syllabic nasal surfaces as either a nasal vowel or homorganic nasal consonant depending on the context surrounding N. I present the representation from Yoshida S. (2003) below. I modify the representation by replacing the element |N| with |L|.

(20) Representation of /N/ proposed by Yoshida S. (2003)

```
O1   N1
|    |
x    x

  |L|
```

To motivate this representation, let us examine the data in which N may be interpreted as a vowel or a consonant.

6.3.1 The variable phonetic realisation of N

Bloch (1954), Vance (1987, 2008) and Yoshida S. (1996, 2003) among many others have noted that the syllabic or moraic nasal N is variable in its realisation. It is typically assumed in phonological accounts of Japanese that N is a homorganic nasal consonant preceding a consonant as in [hondana] ‘bookshelf’, as a uvular nasal consonant word-finally as in [hoN] ‘book’. (e.g. Vance 1987, 2008; Yoshida S. 1996, 2003, Labrune 2012a). The intervocalic representation of N is under debate - Vance (2008) proposes that in intervocalic position, N is realised as a nasal glide, giving [saũ̯i] for /saN-i/ or ‘third rank’. Yoshida S. (2003) proposes that N can be realised as a nasal vowel or a nasal vowel copy of the preceding vowel, as in /hoN-o/ [hoõo] ‘book-ACC’/ The obvious point of agreement in the literature is that the moraic/syllabic nasal is variable, and that it is not always realised as a nasal consonant.

Vance (1987:34-35) notes that from an acoustic and instrumental point of view, closure during the realisation of final N is unclear. Various instrumental studies show either a lack of closure (citing Aoki 1976:204-204; Kawakami 1977:43) or existence of closure (citing Nakano 1969:220) during final N.

With regards to the effect of N on the preceding vowel, Bloch (1954), Vance (1987, 2008, 2013) and Kawahara (2016) further claim that the nasal N may nasalise the preceding vowel, giving the word /hoNo/ the form [hõõo] ‘book-ACC’. Not all sources transcribe or note nasalisation preceding N, however. Nasalisation preceding N is not noted in discussions of Japanese phonetics from Shirota (1993) and Akamatsu (1997). Vowel nasalisation is discussed in other sources, namely as ‘anticipatory nasalisation’ in an instrumental EMG study from Ushijima & Hirose (1974) and noted in further phonetic studies by Nakano (1969) and Campbell (1999).

The independence of the moraic nasal with regards to preceding and following segments is supposedly uncontroversial. For example, Vance (1987:67ff) discusses the ability of the moraic nasal be given the status of a beat in poetry and song. Vance (2008:101) further claims that native speakers have an intuition that N is similar in duration to a normal CV syllable. Labrune (2012) also notes that N is never realised as a typical nasal onset in isolation, e.g. /ta.N.i/ ‘credit’ is never realised as *[tani]. In some careful speech, such as read speech, it is clear that orthographic N may be realised in isolation as [ũ], noted in Nakano (1969) and Yoshida S. (2003).

6.3.2 Previous representations of N

The need to represent the moraic nasal as a mutable segment is clearly necessary. A representation for /N/ as a [+nasal] consonantal position is presented in Itō (1987), and a similar representation of a nasal feature associated to a coda constituent is found in Abe (1987). Such representations fail to account for the possible vocalic realisations of the moraic nasal. Vance (2008) associates the feature [nasal] to the second mora of a

syllable and claims that N intervocalically is realised as a nasal approximant or [ɰ̃]
through association of a default [dorso-uvular] place feature. What is concerning here is that such a place feature does not occur elsewhere in the phonology of Japanese. In the proposal presented by Labrune (2012a,b), the [+nasal] feature is associated to the consonant position of a prosodeme (i.e. mora), with further features spreading from surrounding consonants. The previous representations in various frameworks are able to account for the realisation of /N/ as a homorganic nasal consonant through feature spreading. However, to my knowledge no theoretical account outside of GP has dealt with the vocalic realisations of /N/ besides the proposal from Yoshida S. (1996, 2003). Yoshida Y. (1999) also presents a similar representation to that discussed by Yoshida S., but I discuss only the most recent proposal below.[17]

6.3.3 The realisation of N in further detail

Let us examine the various final and medial realisation of N in more detail, as presented by Yoshida S. (1996, 2003). Consider the data in (21) drawn from Yoshida S. (2003:528-532), who draws data from his own observations. As the transcription of /N/ preceding a fricative or glide varies greatly between all of the sources discussed thus far, I focus only on the realisation of N intervocalically, preceding a pause and preceding obstruents.[18] Yoshida S. provides both 'more careful' pronunciations typical of emphatic speech and 'less careful' pronunciations typical of informal speech. More careful pronunciations and less careful pronunciations are separated with a tilde, with less careful pronunciations on the right.

(21) Moraic nasal realisation variation (Yoshida S. 2003:528-532)

a. Preceding a pause – variation between uvular/velar nasal or nasal vowel

/kiN/	[kiN]/[kiŋ] ~ [kiĩ]	'gold'
/seN/	[seN]/[seŋ] ~ [seẽ]	'line
/saN/	[saN]/[saŋ] ~ [saã]	'Mr., Ms.'
/hoN/	[hoN]/[hoŋ] ~ [hoõ]	'book'
/buN/	[buN]/[buŋ] ~ [buũ]	'sentence

[17] Yoshida Y. attempts to account for the complementary distribution between accented [nu] and the historical development of [N] found elsewhere. My criticisms for Yoshida S.'s proposal regarding inability to account for nasalisation and tone spreading processes also apply to her proposal, though I do not discuss this issue further here for reasons of space.

[18] I do not expand on this as I claim below that N is always a vowel and the process of nasal assimilation is not a phonological process.

b. Preceding bilabial/alveolar/velar consonants – no variation

/hoNpo/	[hompo]	'head store'
/hoN+bakari/	[hombakari]	'book.only'
/hoN+mo/	[hommo]	'book.also'
/hoN+to/	[honto]	'book.and'
/hoN+de/	[honde]	'book.by'
/hoN+no/	[honno]	'book.GEN'
/hoNtɕo:/	[hontɕo:]	'the central gov't office'
/hoN+ka/	[hoŋka]	'book.interrogative'
/hoN+ga/	[hoŋga]	'book.NOM'

c. Preceding vowel

/taN'i/	[taũi] ~ [taãi]	'credit'
/hoN'i/	[hoũi] ~ [hoõi]	'real motive'
/nihoN+e/	[nihoũe] ~ [nihoõe]	'Japan.LOC'
/siN'ai/	[ɕiũai] ~ [ɕiĩai]	'affection'
/naN+a/	[naũa] ~ [naãa]	'South Africa'
/hoN+o/	[hoũo] ~ [hoõo]	'book.ACC'
/keN'o/	[keũo] ~ [keẽo]	'hatred'
/iN'utu/	[iũutsu] ~ [iĩutsu]	'gloomy, melancholy'

To provide further evidence in support of the variable nature of the syllabic nasal, I present dynamic alternations of /N/ with suffixed forms of the word /hoN/ 'book' below in (22). Note that I do not transcribe vowel nasalisation below, following the data transcription above. I revisit this omission in 6.3.7, and inclusion of this phenomenon leads me to revisit the representation of N.

(22) Variation of /N/ in /hoN/ 'book'

a. Preceding a pause

/hoN/	[hoN]/[hoŋ]~[hoõ]	'book'

b. Preceding obstruents

/hoN+bakari/	[hombakari]	'book.only'
/hoN+mo/	[hommo]	'book.also'
/hoN+to/	[honto]	'book.and'
/hoN+de/	[honde]	'book.by'
/hoN+no/	[honno]	'book.GEN'

c. Preceding vowels

/hoN+o/	[hoũo]~[hoõo]	'book.ACC'
/hoN+e/	[hoũe]~[hoõe]	'book.LOC'

(23) Summary of syllabic nasal realisations (Yoshida S. 2003:534)

Following Segment	Phonetic realisation	
∅	Careful	[ɴ, ŋ]
	Less careful	[ĩ, ẽ, ã, õ, ũ]
Stop, affricate		[m, n, ŋ]
Vowel	Careful	[ũ]
	Less careful	[ĩ, ẽ, ã, õ, ũ]

Consider the summary of N realisation in (23). Domain-final 'more careful' pronunciations consist of a uvular or velar nasal e.g. [hoN] 'book', while careful intervocalic pronunciations of N result in [ũ] as in [taũi]. Less careful pronunciations of /N/ result in a nasalised copy of the preceding vowel domain-finally and domain-medially, as in [hoõ] 'book' and [taãi] 'credit'. No variation is found preceding stops, with /N/ being realised universally as a homorganic nasal obstruent, as in [bumpo:] 'grammar'.

Yoshida S. (2003) argues that the 'careful' pronunciation of the syllabic nasal realised as a uvular or velar obstruent [N] or [ŋ] is irrelevant. He notes that pre-pausal vowel-final words in Japanese are typically followed by an unreleased glottal stop e.g. [te]~[te$^{ʔ̚}$] 'hand'. Yoshida S. claims that glottal closure is not a part of the phonological representation of these words, and this glottal closure is not claimed anywhere in the literature to be a part of phonological representation. He extends this line of reasoning, claiming that the same analysis is possible for the syllabic nasal. Formal [N] is thus better analysed as a nasal vowel followed by glottal closure, or [ũ$^{ʔ̚}$]. Yoshida S. notes that since a glottal stop is only found following a nasal or a vowel prepausally, such a realisation is never found domain-medially and therefore that the 'less careful' pronunciation is one that should be considered.

I further argue that all 'more careful' pronunciations of /N/ should be disregarded entirely, as a pronunciation such as [taũi] for /taNi/ 'credit' is highly marked in normal, everyday speech, and is typical only of emphatic pronunciation, such as when one is reading out orthography. I only consider here Yoshida's discussion of less careful realisations of /N/. The representation of more careful pronunciations is discussed at length in Yoshida S. (2003), where N realised intervocalically and finally is the product of |L| associated to the nucleus, combined with the phonetic realisation of an unlicensed empty nucleus which is [u], giving [ũ].[19]

6.3.4 The representation of N in Standard GP (Yoshida S. 2003)

Turning now to a GP analysis of the above variation, consider now the proposed representation of the syllabic nasal from Yoshida S. (2003) below.

(24) Revised representation of /N/ proposed by Yoshida S. (2003)

$$\begin{array}{cc} O_1 & N_1 \\ | & | \\ x & x \\ & \\ \multicolumn{2}{c}{|L|} \end{array}$$

Yoshida S. (2003) proposes that the syllabic nasal is best represented as a floating nasal element. This element associates to an onset when a following onset is present, contracting an IOG relation and triggering assimilation. This p-licenses the empty nucleus, which would otherwise fail to be p-licensed. When no following consonant is available, the nasal element |L| attaches to the nucleus and is either realised as a back vowel with nasalisation as in more careful pronunciation, or as a nasal vowel with its place copied from the preceding vowel. This then silences the empty onset. I examine these representations in depth shortly. The various phonetic realisations of N are thus linked directly to the surrounding segmental and structural context.[20] This builds on previous proposals presented in Yoshida S. (1996) and Yoshida Y. (1999). Let us now examine the proposed structure of N and its behaviour in further detail.

6.3.4.1 N as an assimilated consonant

Preceding an onset, Yoshida S. accounts for ‘coda assimilation’ of N through association of the |L| element to the onset with concomitant assimilation through IOG. Recall that the syllabic nasal preceding obstruents is always realised as a homorganic nasal obstruent. N in this position, represented underlyingly as $|\underline{L}|$, gains any elements from the following onset, and is realised as $|A?\underline{L}|$ or [n] preceding alveolars, $|U?\underline{L}|$ or [m]

---

[19] See Yoshida S. (1996), Yoshida Y. (1999) and Nasukawa (2010) for discussion of [u] as the realisation of an empty nucleus in Japanese. I assume there are both lexical [u]’s and those which are the interpretation of empty nuclei. I propose briefly that epenthetic vowels in loanwords are realised empty nuclei, but I do not discuss this proposal further here.

[20] This brings to mind the realisation of the Tiberian Hebrew definite article, which is [ha] followed by a geminate when the noun-initial consonant can geminate, or [ha:] when followed by a guttural-initial word. See Lowenstamm & Kaye (1986), Lowenstamm (1996) and references therein for discussion. Here too, the p-licensing of an empty position is provided by the relation of two consonantal positions unless the context is not met, in which case the vowel or nuclear position is filled through spreading.

preceding bilabials and |ʔL̲| or [ŋ] preceding velars (cf. Chapter 3 on representations of segments).

Yoshida S. (2003) proposes that the floating nasal element is associated to the onset as a following obstruent is available to form an IOG domain, shown in (25). This has the effect of p-licensing the empty nucleus present within the onset-nucleus pair. Consider the representation of /hoN-to/ [honto] 'book-and' below. (I exclude onset licensing and government licensing from the below diagram).

(25) Representation of [honto] 'book-and' (Yoshida S. 2003:540)

<table>
<tr><td>O_1</td><td>N_1</td><td>O_2</td><td>$\underline{N_2}$</td><td>O_3</td><td>N_3</td></tr>
<tr><td>x</td><td>x</td><td>x</td><td>x̲</td><td>x</td><td>x</td></tr>
<tr><td>h</td><td>o</td><td>n</td><td>←</td><td>t</td><td>o</td></tr>
<tr><td></td><td></td><td>|L̲|</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>|ʔ|</td><td><<</td><td>|ʔ̲|</td><td></td></tr>
<tr><td></td><td></td><td>|A|</td><td><<</td><td>|A|</td><td></td></tr>
</table>

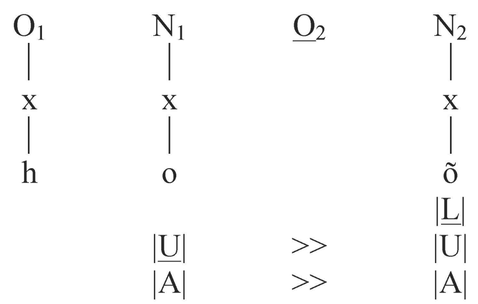
An IOG relation contracts between O_3 and O_2. Melodic material from the governing onset head is shared as a governing relation is created, giving rise to a homorganic nasal consonant with spreading of the place element |A| and closure element |ʔ|. Note that spreading here occurs in the course of the derivation. Harris (1994) has proposed that spreading is rather more like sharing, where the elemental material in the head onset is interpreted on the governed position, but underlyingly is not associated to this position. Some languages do, however, exemplify mutual spreading so that the governing head can have sufficient complexity to govern; see the case of nasal hardening in Bemba discussed by Kula (2002, 2006), where fricatives harden to stops when the first person prefix N is added to certain verb stems.

6.3.5 Domain-final N

To account for the vocalic realisation of N in domain-final position, Yoshida S. proposes that |L| associates to the nucleus when no following onset is found. Assimilation further affects this position. /N/ is thus realised as a nasal vowel with place assimilation in casual speech, as in [hoõ] 'book'.

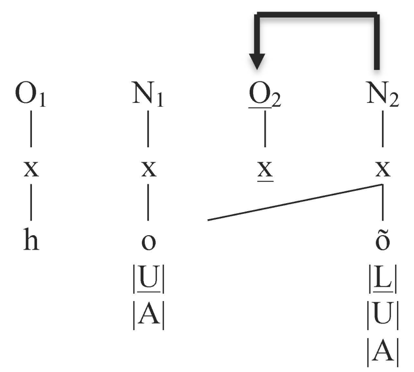
Yoshida S. (2003) accounts for this realisation through the association of the floating element to the empty nuclear position. The nasal element cannot associate to the onset position domain-finally, as an IOG relation cannot contract. If |L| were associated to the onset preceding the final nucleus, the domain-final nucleus would be empty and the ECP would be violated. Recall that domain-final empty nuclei in Japanese are not p-licensed by the domain-final parameter of the ECP. The floating |L| therefore associates to the final nucleus position to satisfy the ECP. To account for the fact that the final nasal vowel is the target of assimilation, Yoshida S. further claims that other elemental material is gained from the preceding nucleus. While he does not present a representation, I provide one below.

(26) Representation of [hoõ] 'book', drawing on Yoshida S. (2003)



Yoshida S. does not clarify why elemental material spreads to the nucleus containing |L|. It is possible that this is due to the fact that a nucleus with |L| alone does not form an appropriate nuclear expression. It is also possible that the nucleus gains material from the preceding V position in order to support N_2 in properly governing and silencing the empty O_2, shown below. This may reflect the impossibility of a glottal stop to precede N. This occurs optionally when vowels are in hiatus. (For discussion of hiatus and optional glottal stop insertion in empty onset positions, see the following chapter). I remain agnostic as to which particular representation I endorse, as I shortly present a proposal in which assimilation as shown is non-existent as a phonological process.

(27) Revised representation of [hoõ] 'book'



6.3.6 Intervocalic N

In the proposal from Yoshida S., the syllabic nasal is also realised as a vowel intervocalically, as there is no following onset to enact an IOG relation. As with domain-final N, the nucleus would remain empty and fail to be p-licensed if |L| were associated to the onset, as proper government is not freely active in Japanese. Consider the following representations of /N/ intervocalically as in /taNi/ [taãi] 'credit'. As with the domain-final realisation of /hoN/ seen previously, |L| associates to the empty nucleus and elemental material is shared from the preceding nucleus. The following representation is from Yoshida S. (2003:539)

(28) Representation of [taãi] 'credit' (Yoshida S. 2003:539) with added elements

O_1	N_1	O_2	N_2	O_3	N_3
x	x		x		x
t	a		ã		i
			$\lvert\underline{L}\rvert$		
	$\lvert A\rvert$	>>	$\lvert A\rvert$		

It is possible here as well that the sharing of elemental material occurs because a nuclear position with $\lvert\underline{L}\rvert$ alone is not a proper nuclear expression, or that the nucleus cannot properly govern the preceding empty onset position. Elemental material from the preceding N_1 position is shared in order for N_2 to contain a proper nuclear expression or to properly govern empty O_2.

(29) Revised representation of [taãi] 'credit'

O_1	N_1	$\underline{O_2}$	N_2	O_3	N_3
x	x	$\underline{x}$	x		x
t	a		ã		i
			$\lvert\underline{L}\rvert$		
	$\lvert A\rvert$	>>	$\lvert A\rvert$		

While these representations do account for the data presented by Yoshida S., I claim that the data itself should be revisited. Consideration of phonological processes should be incorporated into the discussion and reflected in the proposed representation. Finally, theory internal issues with this representation are present and must be accounted for.

6.3.7 Additional facts to be incorporated into our analysis of N

The above facts and the representation are a poor fit for the data with regards a number of processes. First, recall vowel nasalisation. The vowel preceding the moraic nasal N is nasalised in all cases, whether N is realised as a homorganic stop or not. This is exemplified in words such as [hõndana] for /hoNdana/ 'bookcase' or [hõõo] for /hoN-o/ 'book-ACC'. The only proposal to account for nasalisation is found in syllable-based work by Vance (1987, 2013) and Kawahara (2016), where the domain of nasalisation is assumed to be the syllable.

Yoshida S. does not discuss nasalisation and the representations cannot account for it. No relation between consonantal N, or |L|, in the onset position and the preceding nucleus is present. While progressive spread of elemental material is proposed by Yoshida S. when |L| is associated to the nucleus, there is no mechanism which is obvious to account for nasalisation, though mutual spreading and the formation of a nucleus-to-nucleus governing domain is a possible explanation.

An additional issue for the representation of N as a floating |L| element is that this representation allows for an abstract underlying form which never surfaces, containing two unlicensed and unfilled positions in the lexicon. While these positions are not empty following association of |L|, this analysis presumes that all instances of N are underlyingly unassociated.

Furthermore, to account for the alternation of N as a nasal vowel and as a consonant in suffixed words, seen in the bare noun /hoN/ [hoõ] 'book' and suffixed forms such as /hoN-ga/ [hoŋga] 'book-NOM', the association between the |L| element and its nuclear constituent would have to be severed. Recall that the nominative particle /ga/ is analysed as an Analytic suffix. The form /hoN-ga/ would be processed as two Analytic domains, one independent and one dependent or [[hoN]ga]. |L| is associated to the final nucleus in /hoN/, giving [hoõ]. In the concatenated [noun-suffix] domain, |L| must be severed from the nucleus, and then associated to the onset. This forms an IOG domain with concomitant assimilation to result in the attested output form [hoŋga] 'book-NOM'. While this analysis can obtain the correct result, this alteration of N's structure in the noun violates the Principle of Strict Cyclicity. Relations between segments and their constituents created on one cycle (as well as governing and licensing relations) are not to be undone in further cycles of a derivation. The proposed representation is thus problematic.

Lastly, it is questionable that vowel plus N in intervocalic context and domain-finally is truly a sequence of oral vowel followed by nasal vowel in terms of phonological behaviour. If nasalisation does in fact occur, VN is in fact a sequence of two nasal vowels.

In section 6.5.5 I will turn to a revised representation of N. I will crucially present a discussion of accent assignment and tone spreading. I show that N behaves in an identical manner to the second half of a long vowel or diphthong with regards to accent assignment. Pitch or tone spreading provides further evidence that N patterns with long vowels and diphthongs. I then propose that any sequence of (orthographic) vowel followed by N is in fact a long nasal vowel in phonological representation.

6.4 Long vowels, diphthongs and hiatus in Standard GP

Let us now turn to the previous representation of vowel sequences and long vowels. All short vowels of Japanese are also found as long vowels, while possible diphthongs consist only of [ai], [ui] and [oi] (Kubozono 2015b). All other vowel sequences behave as hiatus sequences, as in [uo] 'fish' and [ie] 'house'. The difference between a long vowel and diphthong on the one hand and hiatus on the other is that the second half of a diphthong or long vowel cannot be the site of an accent, while the second position in a hiatus sequence may be accented.

The usage of two separate nuclei in the representation of long vowels, diphthongs and vowels in hiatus is first proposed Yoshida S. (1996) and Yoshida Y. (1999), but this representation of a long vowel and diphthong as one segment or two segments associated adjacent nuclei only occurs in the underlying form of words. I first consider the facts from accent assignment before revisiting the representation.

6.4.1 Accent assignment

Consider the following data in (30) containing diphthongs and long vowels, motivating the onset-nucleus representation. Consider also the data in (31), where (a) exemplifies non-analytic words with vowels in hiatus in (a) and compounds in (b) contain a long vowel or diphthong.

(30) Accent spread

[ko o ri]	'ice'
[bjo o ki]	'illness, sick'
[ka i te]	'buyer'
[to i si]	'whetstone

(31) Non-analytic words (Yoshida Y. 1999:102-103)

a. Words with hiatus

*				
[á o]	+	[mu ɕi]	>	[a o mu ɕi]
				^
‘blue’		‘insect’		caterpillar
		*		
[hi ka e]	+	[ɕi tsu]	>	[hi ka e ɕi tsu]
				^
‘wait’		‘room’		‘waiting room’

b. Words with a long vowel or diphthong

		*		
[e N so o]	+	[ɕi tsu]	>	[e n so o ɕi tsu]
				^
‘music performance’		‘room’		‘music room’
*		*		
[ɕa ka i]	+	[ga ku]	>	[ɕa ka i ga ku]
				^
‘society’		‘study’		‘sociology’

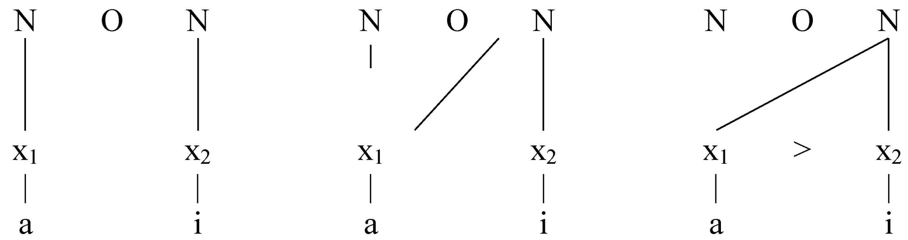
Accent spread shows that long vowels and diphthong are separated into two separate nuclear constituents. With regards to accent assignment data in (31), accent is not placed on the nucleus in the second half of a diphthong or long vowel and shift is evidence, while vowels in hiatus is not affected.

6.4.2 Long vowels and Diphthongs as fused nuclei

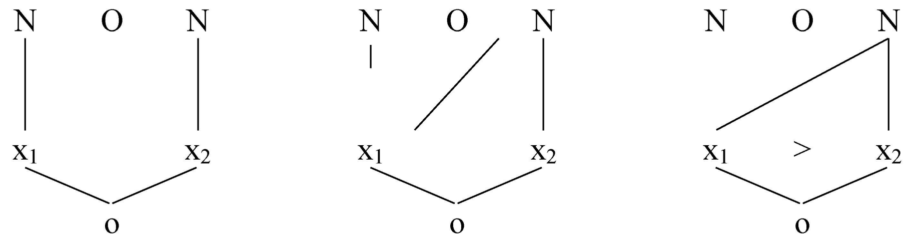
To account for the non-accentuation of the second half of a long vowel or diphthong and the division between these objects and vowels in hiatus, Yoshida S. (1996) proposes that the two nuclei can undergo a process of nuclear fusion, which operates on adjacent nuclei and their skeletal points. Following nuclear fusion, the second half of a long vowel or a diphthong is in the second skeletal point of a surface branching nucleus, and is not accented as it is not the head of the branching nucleus.

Nuclear fusion operates ‘…If (i) N_1 and N_2 are linked to a charmed segment and simplex charmless segments respectively, or (ii) N_1 and N_2 are linked to a single segment.’ (Yoshida Y. 1996:90) Without delving into the specifics of charm, the model first predicts that |A̲|, |AI̲| or |AU̲| are charmed and can govern the expressions |U̲| or |I̲| which are charmless to trigger nuclear fusion and create a diphthong, as in [ɕakáigaku] ‘sociology’. (Further discussion on charm and the reasons for its removal from Element Theory is found in Charette & Göksel 1996, 1998). Sequences such as [ao] do not meet these conditions, and so a hiatus sequence with two adjacent and independent nuclei is evidenced, as in words like [aómuɕi] ‘caterpillar’. All long vowels are underlyingly one segment associated to two nuclei. Nuclear fusion activates to disassociate a skeletal point from one nucleus and re-associating to the other, creating a branching with two skeletal points. The first skeletal point governs the second within this branching constituent under the conditions of Constituent Government (KLV 1990) where government operates left-to-right, which I do not discuss in depth here.[21] I exemplify this process below.

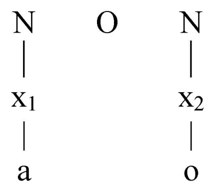
(32) Nuclear fusion in a diphthong /ai/



(33) Nuclear fusion in a long vowel /o:/



(34) Lack of nuclear fusion in hiatus e.g. [ao]



The account for non-accentuation of the second half of diphthongs and long vowels, Yoshida Y. (1999) relies on this process of nuclear fusion. Accent is assigned to the now branching antepenultimate nucleus. Consider the below underlying and surface ‘fused’ representation for the word [ɕakáigaku] ‘sociology’, which I simplify slightly from Yoshida Y. (1999:105).

[21] I do not discuss the finer points of constituent and interconstituent governing relations between skeletal points in a branching nucleus as it is not germane to the present discussion and I shortly discard these representations. Governing relations restrict the possible structure of a ‘syllable’ and are strictly local and strictly directional, applying progressively between the skeletal points of branching onsets and nuclei and regressively in interconstituent contexts. See KLV (1990) and Charette (1991) for fuller discussion.

(35) Underlying representation of [ɕakáigaku] ‘sociology’

O_1	N_1	O_2	N_2	O_3	N_3	O_4	N_4	O_5	N_5
x_1	x_2	x_3	x_4		x_5	x_6	x_7	x_8	x_9
ɕ	a	k	á		i	g	a	k	u

(36) Representation of [ɕakáigaku] ‘sociology’ following nuclear fusion

O_1	N_1	O_2	N_2	O_3	N_3	O_4	N_4	O_5	N_5
x_1	x_2	x_3	x_4	>>	x_5	x_6	x_7	x_8	x_9
ɕ	a	k	á		i	g	a	k	u

Above, the skeletal point x_4 associated to N_2 re-associates to N_3, forming a branching nucleus. This skeletal point x_4 is the governor and head of the branching nucleus. This head is the site of interpretation for the accent assigned to this nucleus according to Yoshida Y. (1999).

I argue that fusion of this type in effect forces an analysis of Japanese in which it is a branching language on the surface. Additionally, I argue that nuclear fusion violates certain tenets of GP. Let us consider the problem with nuclear fusion before continuing on to fresh proposals

6.4.2.1 The problem with nuclear fusion

Nuclear fusion as a theoretical device is problematic within GP for a number of reasons. First and foremost, the link between the nucleus and the skeletal position associated to it is severed, which I argue is a violation of the Projection Principle. Recall that this principle bans the deletion of any governing or licensing relations present in the lexicon– I assume that this also includes the relation between a skeletal point and the nucleus to which it is attached.

In addition, the re-association of the segmental material in the first nucleus leaves an empty nucleus which fails to be p-licensed. The ECP would be violated but no vowel surfaces in this position (and indeed the nucleus lacks a skeletal point entirely). There is no way to p-license this empty nuclear position unless one arbitrarily assumes that proper government obtains where nuclear fusion has occurred. IOG cannot contract in this position as the onset following the empty nucleus is itself empty. The result is a bare nucleus and unlicensed following the phonological computation of a domain which cannot be licensed or governed without further (arbitrary) complexification of the theory.

Nuclear fusion also forces an analysis where accent assignment occurs after nuclear fusion. The correct result of accent assignment to the initial vowel in a diphthong, for example, is dependent upon a nucleus fusing before accent assignment. However, if nuclei fuse before accent in a word is assigned, then a word-initial branching nucleus would never be the target of pitch spread in a word such as [kaite] 'buyer' and high pitch would not be found across any portion of the nucleus, as tone spreading in Tokyo Pattern A terminates at the pen-initial nucleus. This is contrary to the attested data. [22]

Lastly, fusion wrongly suggests that a nucleus containing the expression |A| can govern nuclei containing either of the elements |I| and |U| in order to form a diphthong. This is incorrect; nuclei containing only |U| are never good governees, and /au/ sequences found in loanwords do not form a diphthong in modern Japanese (cf. Kubozono 2015b), which I discuss in further detail in the following chapter. Furthermore, conditions on nuclear fusion do not predict that /ui/ is a possible diphthong, as |U| and |I| are not potential governors, only potential governees. This cannot account for /ui/ behaving as a diphthong (e.g. accent shift found in [ɕinsúiɕiki] 'new boat launching ceremony' *[ɕinsuíɕiki], Kubozono 2015b). For these reasons, I reject nuclear fusion entirely as a mechanism to account for the phonological facts.

6.5 Strict CV: To a strictly non-branching account

I now propose an alternative representation of Japanese moras and syllables where Japanese words are formed of strictly repeating consonant and vowel positions, framed within the strict CV hypothesis first presented by Lowenstamm (1996) and later developed in Scheer (2004, 2012) and other works. I propose that long vowels and diphthongs can be represented as truly non-branching structures and that the behaviour of N can be accounted for through a new proposal that N is a nasal vowel. No syllable or branching constituents are referred to.

6.5.1 The basic foundations of Strict CV

Lowenstamm (1996) proposes that all words are composed of strictly repeating Consonant and Vowel (or C and V) positions. Branching constituents are rejected, and the division between the constituent, skeletal tier and the segment is collapsed, with segments (rather elements) directly associated to either a C or V position.

[22] I revisit the analysis of tone spreading patterns in Chapter 8.

Further benefits of the framework are the simplified forces of government and licensing proposed by Scheer (1998, 2004). Government is redefined as a force which silences an empty position or weakens a filled position, while Licensing supports the relevant empty or filled position.[23] Government and licensing between C and V positions only operate regressively within a word above the CV tier, while relations may hold between segments based on complexity below the skeletal tier. Forces such as Onset licensing are not used in Strict CV as the CV tier is simply provided 'for free' as the architecture for phonological domain building, according to Scheer (2004).[24] I discuss the use of government in geminates and licensing of long vowels for Japanese later in this section, while I redefine the moraic nasal entirely. I do not present extended discussion on the simplification of government and licensing, but this is found in Dienes & Szigetvári (1999), Scheer (2004, 2012) and Szigetvári (2013). A further benefit is the ability to refine the projection of nuclei, or V positions, through the use of parameters (Scheer & Szigetvári 2005). Later in this chapter, alter the proposal from Yoshida Y. (1999) that governed nuclei never project (cf. section 6.7). For further examination and re-analysis of phenomena such as compensatory lengthening which are used to argue in favour of the mora, see Lowenstamm (1996) and Scheer (2004) for extensive discussion

With regards to the mora, it is now redefined as a CV pair, generally following the spirit of Yoshida Y. (1999). When considering accent, I unify the cause of syllable 'accent shift' effects as the non-projection of a V position. In the remainder of this section, I present revised representations for Japanese syllables.

6.5.2 Open syllables in a CV account of Japanese

Compare the Onset-Nucleus representation and the revised representation of [murasaki] 'violet' below. Note that in words with only open syllables, the difference in representation is largely cosmetic.

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[23] This redefinition has further implications regarding lenition of consonants, but lenition is not found in Tokyo or Owari Japanese. For more on the redefinition of licensing and government and the concomitant effects in Strict CV, see Scheer (2004), Cyran (2006), Scheer & Ségéral (2008), Ziková & Scheer (2010), Scheer (2012) and Szigetvári (2013).

[24] Scheer (2004) and Cyran (2010) do not use the skeleton but are careful not to claim that the skeleton is possibly not entirely redundant. Monik Charette (p.c.) notes that phenomena such as h-aspiré requiring a governed skeletal point under an onset constituent are a challenge for the rejection of the skeleton. Many other phenomena supporting the mora or skeleton are re-analysed successfully, cf. Scheer (2004) and Scheer & Szigetvári (2005)

(37) Structure of [murasaki] ‘violet’ in Standard GP

O_1	N_1	O_2	N_2	O_3	N_3	O_4	N_4
x	x	x	x	x	x	x	x
m	u	r	a	s	a	k	i

(38) Structure of [murasaki] ‘violet’ with a CV tier

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
m	u	r	a	s	a	k	i

With regards to heavy syllables and quantity, the length of a segment is now represented by the double association of a given segment to either two C or V positions, instead of association to two points on the skeletal timing tier. The contrast between a long vowel or short vowel is not defined by the amount of skeletal points or moras a segment is associated to, but the amount of C or V positions it is associated to. Consider below the revised representations utilised for the Japanese words [ha] ‘tooth’, [to:] ‘tower’ and [bat:a] ‘grasshopper’. Empty positions are underlined to represent a silenced position, which I expand upon below.

(39) Representation of CV, CV: and CVC:V words in Japanese

a. [ha] ‘tooth’

C_1	V_1
h	a

b. [to:] ‘tower’

C_1	V_1	$\underline{C}_2$	V_2
t	o		

c. [bat:a] ‘grasshopper’

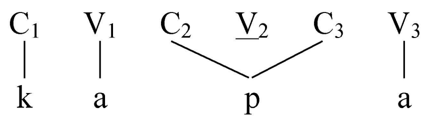
C_1	V_1	C_2	$\underline{V}_2$	C_3	V_3
b	a	t			a

This representation utilising the CV and segment tier will be assumed for the remainder of this thesis. The following sections consider the GP representation for ‘special moras’, which are all formed of CV pairs. Accent shift is accounted for by considering the

6.5.4 Geminates in CV: the representation remains the same

Geminates are represented as one segment associated to two C positions, which is nearly identical to the representation proposed by Yoshida Y. (1999) in Standard GP. Scheer (2004) proposes that the empty V position within a geminate is governed, while Dienes & Szigetvári (1999) propose that there are potential relations between two C positions, called C-to-C government, which buries and silences the empty position. From this viewpoint, the link of a segment between two positions is an effect of C-to-C government. This is nearly identical to Onset-to-Onset government (Cyran's IOG) proposed in Gussmann & Kaye (1993) and discussed above to Japanese (cf. Yoshida S. 1996, Yoshida Y. 1999). I retain the use of this relation as C-to-C government, due to the fact that (proper) government between a filled V position and an empty position is not clearly active in Japanese.

(43) Representation of a geminate as in [kap:a] 'kappa, river imp'



With regards to the non-accentuation of the empty V within a geminate, I presume that this nucleus can never be the site of an accent as the V position is not only governed but also lacking in elemental content.[26]

6.5.5 A new proposal for the representation of N

I now propose that orthographic N is in fact the second half of a nasal vowel. This accounts for the facts regarding nasalisation, the realisation of N as a vowel and also accounts for the patterning of so-called N in tone spreading, which I discuss shortly. I present my representation for N in pre-consonantal and intervocalic position below. N as a consonant is not considered a phonological object under this view, which I discuss shortly.

[26] This is in contrast to filled V positions which are licensed or governed, which may receive an accent in certain circumstances and dialects. I discuss final projection in Tokyo Japanese in 6.7, while Kansai Japanese is briefly discussed in the conclusion of this thesis.

(44) CV representation of <keNka> or [kẽ:ka] ‘quarrel’

C_1 V_1 $\underline{C}_2$ V_2 C_3 V_3

k ẽ k a

$|\underline{I}|$

$|A|$

$|L|$

(45) CV representation of <taNi> or [tã:i] ‘academic credit, unit’

C_1 V_1 $\underline{C}_2$ V_2 C_3 V_3

t ã i

$|\underline{A}|$

$|L|$

Firstly, recall that a process of nasalisation occurs preceding every instance of N in traditional descriptions. Based on the above proposal, nasalisation is not a phonological process. Nasality is an inherent property of the vocalic expression. Nasality is represented by the element |L| in each expression.

6.5.5.1 N and tone spreading

Now let us briefly consider the behaviour of so-called N with regards to tone spreading. As discussed in Chapter 1, Tokyo Pattern A spreading is insensitive to the nature of the initial syllable. Yoshida Y. (1999) proposes that this spreading occurs until the initial nucleus, here understood to be the initial V position. Tokyo Pattern B, however, exhibits spreading that affects the initial V position in certain circumstances when the initial syllable is heavy. Consider the following data.

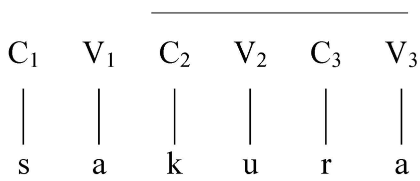
(46) Tokyo Pattern B tone spreading (representative)

a.	[sa $\overline{\text{ku ra}}$]	‘cherry tree’
b.	[$\overline{\text{ko o ri}}$]	‘ice’
c.	[$\overline{\text{ka i te}}$]	‘buyer’
d.	[$\overline{\text{ke ŋ ka}}$]	‘quarrel’
e.	[ba t $\overline{\text{ta}}$]	‘grasshopper

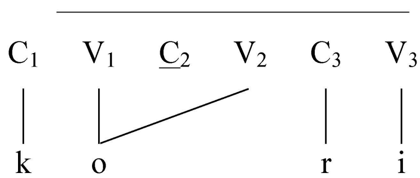
For speakers of Tokyo Pattern B, heavy CV:, CVi and CVN syllables trigger futher spreading which affects the initial mora. Crucially, heavy CVQ syllables do not exhibit the same behaviour. Analogous behaviour is seen in the Owari dialect (see Chapter 8). If N is a consonant associated to the C position, why would CVN pattern with CV: and not CVQ when undergoing tone spreading?

To account for nasalisation and the patterning of long vowels and so-called vowel nasal sequences. Consider my claim that /VN/ is in fact /Ṽ:/. The patterning of CVN syllables with CV: and CVi syllables is caused by the fact that they share identical structure, where the initial and pen-initial vowels are filled. CVQ syllables do not align structurally with these 'heavy syllables', as the initial V and following V are unrelated. Representations are presented below, with high tone represented with an overline.

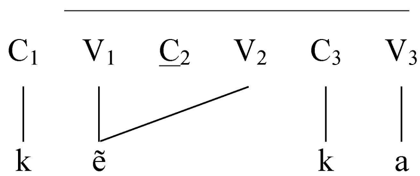
(47) CV representation of [sakúrá] 'cherry tree'



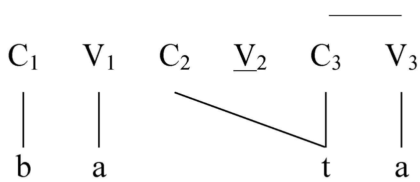
(48) CV representation of [kó:rí] 'ice'



(49) CV representation of [kẽ́:ká] 'quarrel



(50) CV representation of [bat:á] 'grasshopper



6.5.6 Special moras & representational redefinition

Above, I have presented a CV account for special mora representation. I have presented revised representations for heavy syllables containing the special moras R, J and N while I have largely retained the representation of a geminate from Yoshida Y. (1999). Vowels in hiatus, diphthongs and long vowels are formed of two V positions straddling an empty C position. The two V positions are independent when vowels are in hiatus, while the second V position is either externally licensed (as in long vowels) or governed (as in diphthongs), discussed further in Chapter 7. Nuclear fusion is eliminated as a process in Japanese. Geminates have retained a similar structure to that proposed in the Standard GP proposals from Yoshida S. (1996) and Yoshida Y. (1999), though NC clusters and the moraic nasal have been radically redefined. I have proposed that any CVN syllable is always composed of a long nasal vowel. With reference to 'special moras', all are unified as CV pairs containing a V position, which is either filled and governed or licensed (R, N, J), or alternatively a CV position with an entirely empty C position (Q). These representations must now be incorporated into our discussion of licensing structure presented in Chapter 5, and an account for 'accent shift' without the syllable is called for.

6.6 Licensing structure and the involvement of 'special moras'

In the following section, I discuss first in 6.6.1 the Standard GP account of 'accent shift', where the unaccentability of a special mora is due to non-projection of a governed nucleus. In 6.6.2, I then revise the licensing structure of the relevant contexts in light of the proposed Strict CV representations, while retaining the non-projection of certain V positions in the spirit of Yoshida Y. (1999). I propose in Section 6.7 that domain-final, but not domain-medial, governed/licensed positions project.

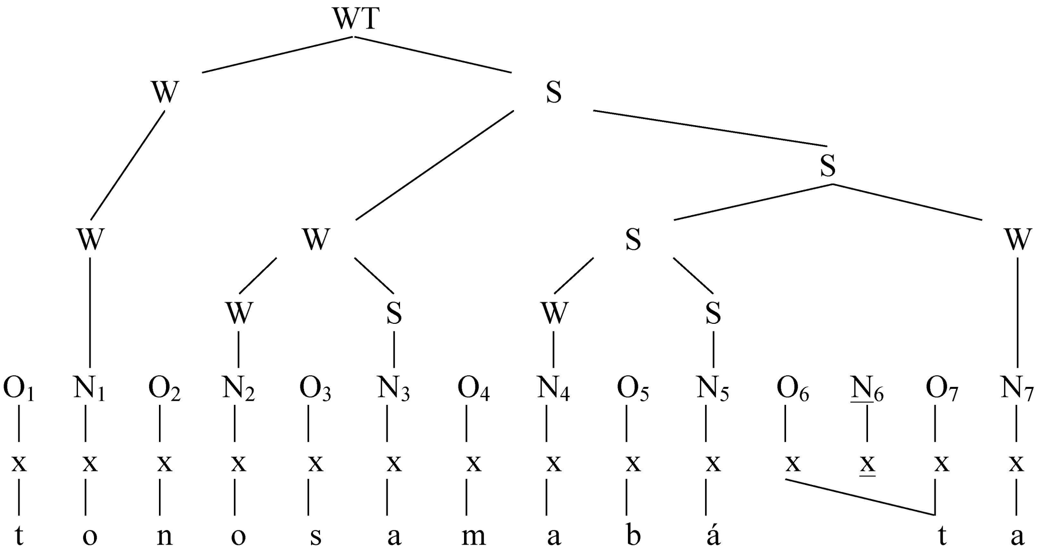
6.6.1 Accent assignment in Standard GP

To account for accent 'shift' from the antepenultimate nucleus to pre-antepenultimate nucleus, Yoshida. Y. (1999) proposes that the antepenultimate nucleus is not assigned accent when it is governed in the representation of a geminate and a moraic nasal. The nucleus does not project and fails to be incorporated into the projected licensing structure of a word. Nuclear fusion prevents accentuation on the governed skeletal point within diphthongs and long vowels. No reference to syllables is necessary; the 'special mora' is simply an ON pair containing a non-projected nucleus or one with two skeletal points.

6.6.1.1 Non-projection of nuclei in geminates and NC clusters in Standard GP

Let us first consider the structure of words containing geminates. Recall that all unlicensed nuclei project to NP 1 and form binary feet from the right-edge, with further projections and licensing relations occurring thereafter until only unlicensed nucleus remains. This nucleus is the head and accented nucleus of the domain. Let us first consider the proposed structure of the non-analytic word [tonosamabát:a] 'locust', which has an antepenultimate accent.

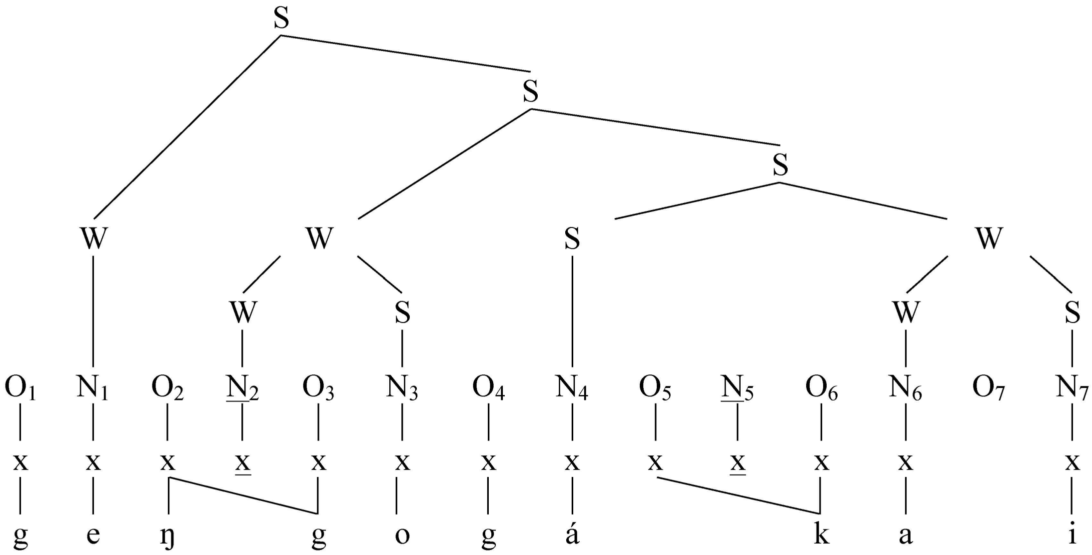
(52) Structure of [tonosamabát:a] 'locust' Yoshida Y. (1999:125)



In the above representation, all nuclei project and form binary feet where possible. While Yoshida Y. does not present extended discussion of this structure, it is clear that N_7 cannot form a foot with N_6, as N_6 is a governed nucleus and thus cannot project. All nuclei then engage in further licensing relations, with head-initial relations at NP2 and all further licensing relations being head-final, with further feet incorporated into the structure one by one at subsequent projections. The antepenultimate nucleus N_5 is not governed and projects, thus receiving the accent.

Now let us examine the effect of a governed nucleus in the antepenultimate position, as in the word [gengogák:ai] 'linguistics conference'. Accent is again found on the head of the penultimate foot, which this time is the pre-antepenultimate nucleus.

(53) Structure of [gengogak:ai] ‘linguistics conference’ (Yoshida Y. 1999:125)



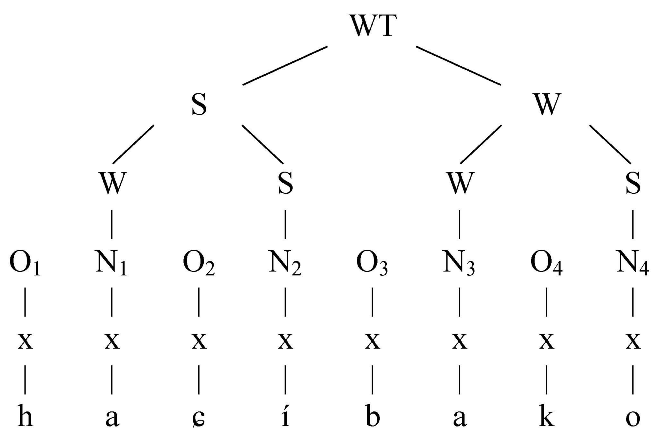
In this word, N_5 is the antepenultimate nucleus and is both empty and governed. It is unable to project and thus cannot be incorporated into the licensing structure. Accent is found on the pre-antepenultimate nucleus N_4 as this nucleus forms the head of the penultimate foot.

There are a few issues in the above representations. First, it is unclear to me why N_4 and N_3 do not form a binary foot. Second, Yoshida Y. assumes the projection of empty and governed N_2 above, which is also a governed nucleus and should not project. I do not comment on the projection of N_7, which is part of a diphthong; see 6.7 for a proposal regarding domain-final governed positions. I revise the structures of these words below. However, crucially the impossibility of antepenultimate accent is caused not by any effects of the syllable, but rather by the inability of a certain nucleus to be involved in licensing structure.

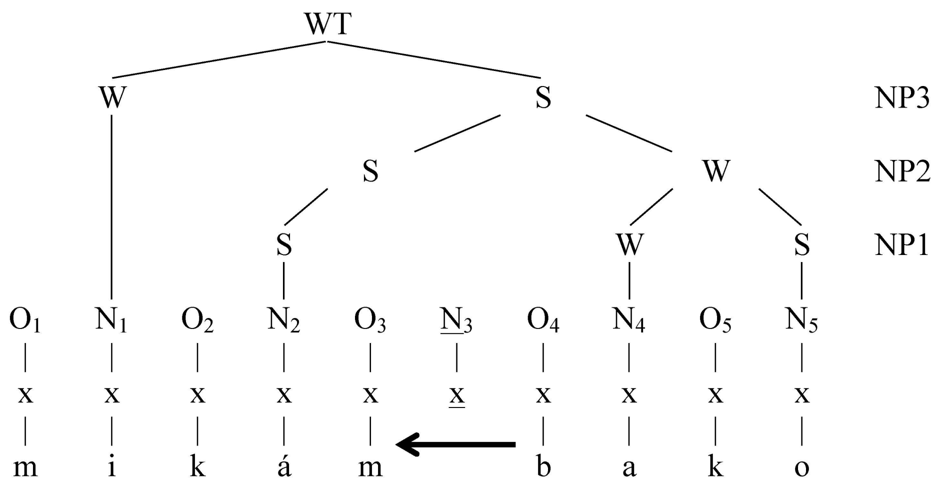
6.6.1.2 The syllabic nasal N

As discussed above for geminates, accent shift in words with a moraic nasal in the antepenultimate position is accounted for through the non-projection of an empty nucleus found within an NC cluster. Accent assigned to the pre-antepenultimate nucleus in the word /hoN_bako/ [hómbako] ‘book box’ as this is the antepenultimate *projected* nucleus. Consider the structure of the word [mikámbako] ‘book box’ below, compared to the structure of [murásaki] ‘violet’ drawn from Yoshida Y. (1999:114-116).

(54) Representation of [murásaki] ‘violet’



(55) Representation of [mikámbako] ‘tangerine cardboard box’

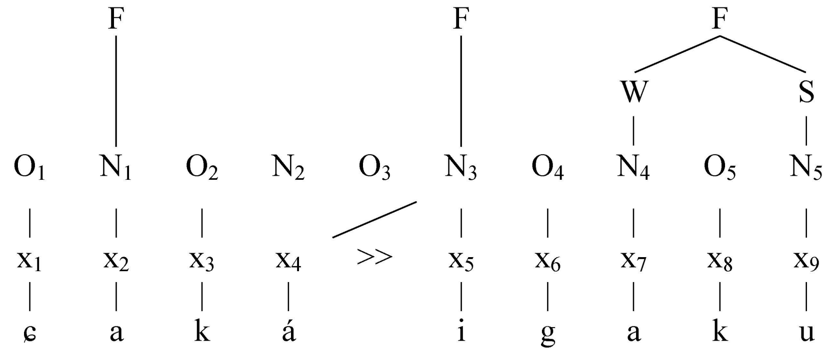


The first diagram represents the unmarked derivation of antepenultimate accent in [murásaki] ‘violet’. The second diagram represents accent assignment in [mikámbako] ‘tangerine cardboard box’. Accent is assigned in both words to the head of the penultimate foot, which is the antepenultimate nucleus in [haɕíbako] ‘chopstick box’ and the pre-antepenultimate nucleus in [mikámbako] ‘cardboard orange box’. While geminates and nasals are unified, the cause for ‘accent shift’ in Standard GP is different for long vowels and diphthongs.

6.6.1.3 Long vowels, diphthongs and hiatus

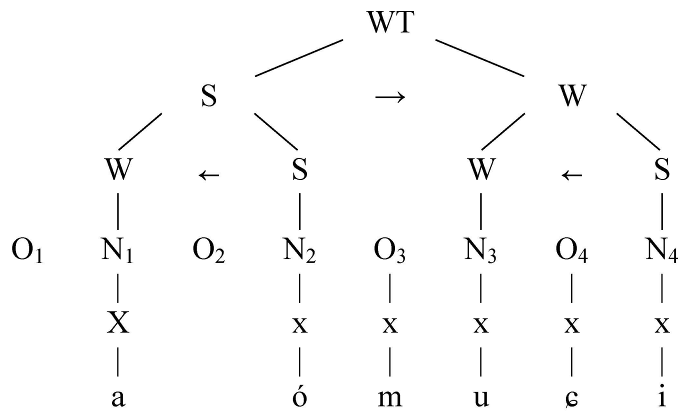
Yoshida Y. relies on nuclear fusion to account for non-accentuation of the second vowel of a diphthong or long vowel. The second vowel is not the site of an accent as it is found in a surface branching nucleus, and accent is assigned to the initial and head skeletal point. Yoshida Y. presents a partial licensing structure for words with medial long vowels or diphthongs, such as [ɕakáigaku] ‘sociology’ (shown below). She claims that N_3 is projected and forms the head of the penultimate foot. Accent is interpreted on the skeletal position which is the head, which I represent as x_4 below. I present a slightly modified and partial representation from Yoshida Y. below.[28]

(56) Modified representation of [ɕakáigaku] 'sociology' (Yoshida Y. 1999:106)



When the antepenultimate nucleus is a vowel in hiatus, no accent shift is countenanced, as in [aómuɕi] 'caterpillar'. This is because the second vowel within a hiatus sequence is ungoverned and can project to form part of the licensing structure. While Yoshida Y. does not present licensing structure, I represent the word [aómuɕi] 'caterpillar' as shown below.

(57) Representation of [aómuɕi] 'caterpillar'



I revisit these structures below without recourse to nuclear fusion below and I argue that non-branching representations are a more elegant and sound alternative.

6.6.1.4 Revising the above structures

In the above derivations, I note that some representations proposed by Yoshida Y. do not contract binary feet where they might otherwise be possible (e.g. between N_1 and

[28] I modify the representation of the segment [ɕ] and do not show a light diphthong following and I renumber the skeletal positions for consistency.

N_2 in (55) above). It is also unclear why final diphthongs are not fused in some of the representations presented by Yoshida Y. as seen in (53) where the final diphthong [ai] forms a binary foot. More importantly, there is a division in the preceding account between reasons for non-accentuation of certain antepenultimate ‘special moras’. For geminates and N, non-accentuation is caused by non-projection through government and subsequent formation of licensing relations. On the other hand, long vowels and diphthongs exhibit accent on the segment attached to the pre-antepenultimate ‘nucleus’ due to nuclear fusion. In fact, accent is assigned to the head of a surface antepenultimate branching nucleus, which is the segment formerly in the pre-antepenultimate position. It is desirable to unify the cause of non-accentuation (without reference to the syllable). I claim that truly non-branching Strict CV representations (Lowenstamm 1996) can provide an answer to the issues identified in previous sections regarding the representations while also unifying all sites of non-accentuation (or ‘special moras’) as positions where the vowel or nucleus does not project.

6.6.2 The revised CV view of licensing above the skeleton

I now turn to the structure of words above the CV skeleton within Strict CV. I retain the proposal from Yoshida Y. (1999) that certain nuclei do not project, however I slightly expand non-projected categories to include both externally licensed and governed nuclei. I later divide non-projected positions into those which are filled, and those which are empty. Empty (governed) V positions within geminates never project in Japanese and do not form part of the licensing structure within a word. Filled and licensed or governed V positions do not project word-medially, but I propose that they do project word-finally (discussed in the final section of this chapter).

In addition, I alter foot formation at NP1 and further projections. I exhaustively form feet at each level, with the head further projecting. I retain the use of S and W from Yoshida Y. (1999) as a convenient label for the symbolic relation between projections of nuclei, with S being the head or licensor and W being the licensee. For the moment I presume that the formation of feet does not span non-projected positions. I presume that directionality is reversed at each projection, with the formation of licensing being regressive at each projection of a domain. This decision is made in the spirit of Scheer (2004, 2012), who proposes that the processing of domains is regressive at the CV tier. I simply expand this proposal to further levels of projection, though directionality of licensing alters at each project as in the proposal from Yoshida Y.

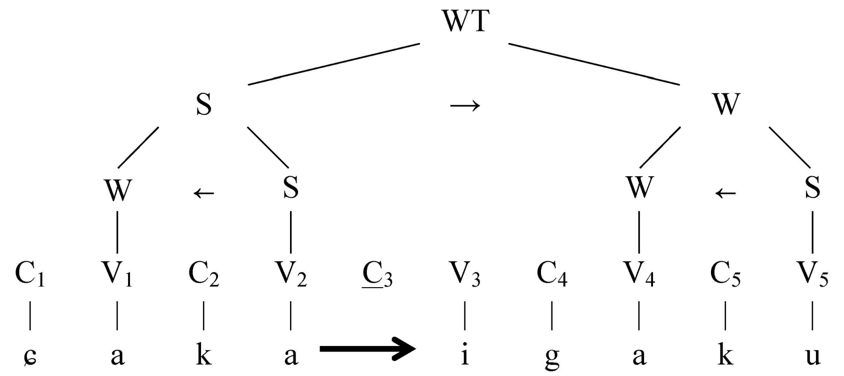
As with a Standard GP account, accent is assigned to the head of the penultimate food and accent shift is not shift. Accent shift is simply the effect of licensing structure, with accent found on the antepenultimate or pre-antepenultimate nucleus depending on the projection capability (or lack thereof) of the V in the antepenultimate position.

6.6.2.2 Long vowels, diphthongs and hiatus in CV

Yoshida Y. (1999) earlier proposed that governed nuclei do not project. I retain this assumption, and assume for the moment that V_2 is governed or licensed when found in a diphthong or long vowel and thus does not project. It is not nuclear fusion that accounts for accent shift in words with diphthongs or long vowels, but rather non-projection of the second V position.

Consider the alternative representation of [ɕakáigaku] below. The proposed structure of a diphthong with a non-projecting second member unifies the root of 'accent shift' as these words contain a non-projected antepenultimate V position.

(60) Revised representation of [ɕakáigaku]



In the representation above, the governed V_3 does not project and is excluded from foot formation at NP1. Licensing relations form at further projections with head-final licensing at NP1 and head-initial licensing at NP2. The accent is assigned to the head of the penultimate foot, V_2.

When the antepenultimate nucleus is a vowel in hiatus, no accent shift is countenanced, as in [aómuɕi] 'caterpillar'. This is because the second vowel within a hiatus sequence is ungoverned and projects. The representation of this word is nearly identical to that in Standard GP. I represent the word [aómuɕi] 'caterpillar' as shown below.

6.6.3 Interim summary

Having considered the revised structures, I have shown that Yoshida Y's proposal regarding non-projection of governed position can account for accent shift in a unified manner, which I extend to additionally cover externally licensed positions. The default accent site is unified as the projected antepenultimate V position. Accent shift is not a separate process and no reference to the syllable or an accent rule is necessary.

In a closely unified manner to the above representations, recall that the special moras R, J and N are claimed to possible accent sites for certain dialects of Japanese by Labrune (2012a), while Q never is (cf. Chapter 4). I propose that this is linked to the fact that there is a filled V in R, J and N. I also claim that the special mora Q is never accented as the V position is empty and cannot project either domain-finally or medially. I now turn to arguments in favour of domain-final projection and then consider how this proposal can account for marginal accentuation of 'special moras'.

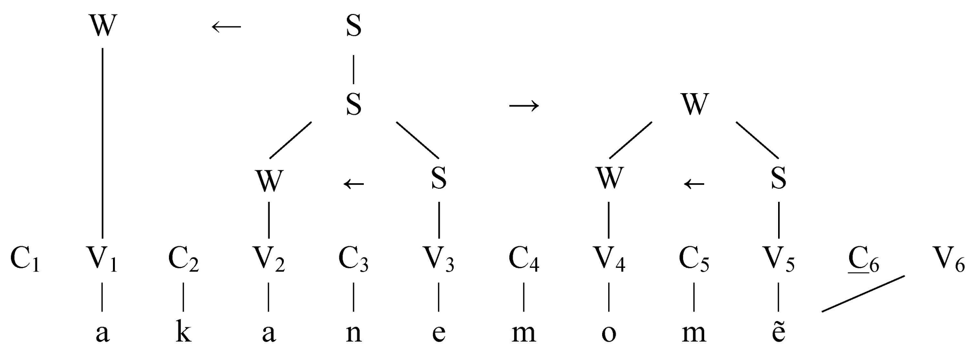
6.7 The projection of domain-final V position

I now propose that final V positions within a nasal vowel, long vowel or diphthong do project when found in final-position. The above discussion has followed Yoshida Y. (1999) and shown that that non-projection domain-medially accounts for accent shift without reference to the syllable. However, I submit that the previous proposals do not account for the involvement of **domain-final** 'special mora' positions and the possibility of accentuation in this position. I first consider final syllabic nasals and then examine domain-final long vowels and diphthongs. I conclude by considering how the projection of final licensed/governed V positions accounts for cases where 'special moras' are accented.

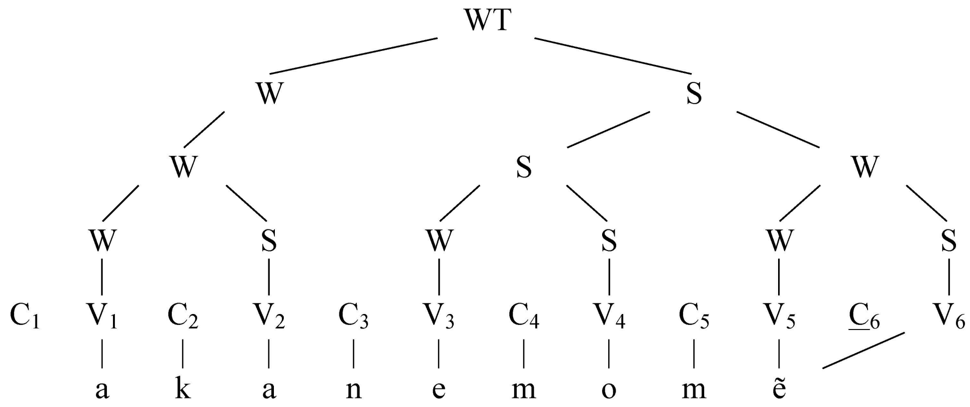
6.7.1 Final N in longer words

In words terminating in a 'syllabic nasal', or rather a nasal vowel, antepenultimate accent is found in words with four nuclei or more. Antepenultimate accent is found in words with a final-nasal, as in the simplex word [arákã:] 'Arhat (Budd.)' or the non-analytic [akanemómẽ:] 'red cotton', from /akane/ '*rubia*, Japanese madder' /momeẽ/'cotton'. Let us first compare the two possible representations for [akanemomẽ:] below. The first representation assumes that the final nasal vowel does not project, while the second does.

(63) Final V not projected, deriving unattested *[akanémomẽ:]



(64) Final V projected, deriving attested [akanemómẽ:] 'red cotton'

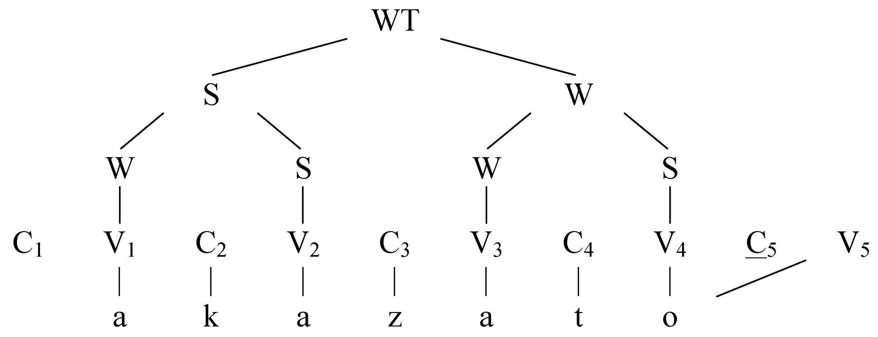


Involving the domain-final nasal in accent assignment correctly predicts the attested accent for the word, namely [akanemómeẽ] 'red cotton'. The assumption that final V positions do not project incorrectly predicts pre-antepenultimate accent when the binary foot is built from the right edge, giving *[akanémomeẽ]. In short, I propose that final V in nasal vowels projects.

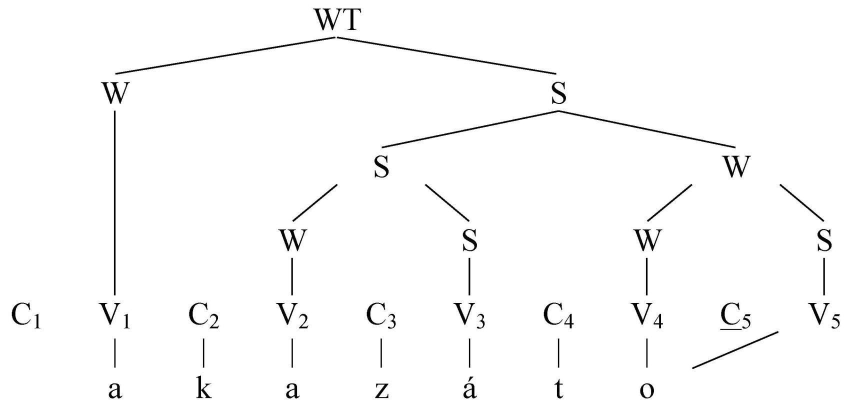
6.7.2 Final diphthongs and long vowels in longer words

Let us now briefly consider the behaviour of final V positions in long vowels and diphthongs. Consider the non-analytic words [akazáto:] 'brown sugar' from /áka/ 'red' + /sató:/ 'sugar' and [utákai] 'poetry competition', from /utá/ 'song' + /kái/ 'meeting' which both have antepenultimate accent. Consider the two possible structures for [akazáto:] 'brown sugar' below. The first assumes that the final V does not project and is not relevant to foot formation. In the second, final V projects and forms part of the foot structure.

(65) Non-projected final licensed V, deriving unattested *[akázato:]



(66) Projected final licensed V, deriving attested [akazáto:] ‘brown sugar’



6.7.3 Towards an account for accent on the ‘special moras’ R, J, N

In Chapter 4, I briefly discussed marginal accent on the ‘special moras’ R, J and N which has been discussed by Labrune (2012a,b). I claim that accent on special moras is not marked or problematic when it occurs in domain-final positions, as this is where the final V projects. First, this proposal can account for accent in ‘unaccented’ words, where pitch (or high tone) is placed on the final mora, or V position, including special moras. Consider the accent patterns of the following unaccented nouns, drawn from Yoshida Y. (1999), though she does not analyse unaccented words terminating in a ‘special mora’. I claim that the above proposal for a projected final V can account for the attested accent patterns. Recall that in unaccented words, surface accent is final.

(67) Unaccented words containing no special moras from Yoshida Y. (1999)

a. [ha $\overline{\text{ɕi}}$] ‘edge’

b. [ha $\overline{\text{na}}$] ‘nose’

c. [sa $\overline{\text{ku ra}}$] ‘cherry tree’

d. [ku $\overline{\text{ru ma}}$] ‘car’

(68) Unaccented words with a final 'special mora' from Yoshida Y. (1999)

a. [õ õ]	<oN>	‘sound’
b. [u dõ õ]	<udoN>	‘udon noodles’
c. [õ õ ĩ ĩ]	<oNiN>	‘phoneme’
d. [gĩ ĩ ko o]	<giNkoo>[30]	‘bank’

(69) Further examples of unaccented words drawn from NHK (2012)

a. [a i jĩ ĩ]	‘lover’
b. [ka tsu bo o]	‘longing’
c. [ga n ta i]	‘eyepatch’
d. [o su i]	‘sewage
f. [ha tsu ko i]	‘first love’

In all of the above unaccented words, accent is placed domain-finally by default. Consider the below licensing structure for /õ:/ ‘sound’. It is identical to that of an unaccented word such as /hana/ ‘nose’.

(70) Licensing structures for /hana/ ‘nose’ and /oõ/ ‘sound’

```
      W   ←   S                 W   ←   S
      |       |                 |       |
 C1   V1  C2  V2           C1   V1  C2  V2
 |    |   |   |                 |_______/
 h    a   n   a                 õ
```

While I do not provide a full analysis of each word listed above, and while some words above may be composed of more than one domain, it is clear that domain-final ‘special moras’ are not special. They can receive an accent domain-finally in an unaccented word. I account for this by claiming that domain-final V positions project, and these V positions are therefore possible targets of accent assignment.

Under this view, the pre-accentuation Labrune notes on special moras caused by a specific and limited set of pre-accenting morphemes such as /-ɕika/ ‘only’ is not

[30] More specifically, this form is orthographically <giNkou> or <ぎんこう>. Long vowels are orthographically diphthongs, but synchronically long vowels (cf. Chapter 3).

problematic or mysterious. I recall the relevant data from Labrune (2012b:125), drawn from Higurashi (1983:35).

(71) Pre-accentuated words with the suffix /-ɕika/ 'only'

a. [mi ja kó]	[mi ja kó ɕi ka]	'only the capital'
b. [ko o e Ń]	[ko o e Ń ɕi ka]	'only the park'
c. [te k kʲo ó]	[te k kʲo ó ɕi ka]	'only the iron bridge'

The set of pre-accenting suffixes which exhibit a high tone on the immediately preceding special mora consist of a limited amount of suffixes, such as /-ra/ 'collective plural'.[31] These suffixes also only affect unaccented nouns. While a fuller set of data is not discussed in Higurashi (1983), I tentatively claim that the above words have the shape [[noun]pre-accenting suffix], though these suffixes allow the stem to retain the stem-final high tone derived in domain [A] in the final domain [AB].[32] Under the view pursued here, the accentuation of the special moras N or R is in fact the accentuation of a domain-final projected V position.

As for the 'special mora' Q, I claim that the nucleus or V position within can **never** be the target of an accent assignment. The V position here is always empty and always governed, with no evidence for its projection. Note that the syllabic nasal, diphthong and long vowel all contain filled V positions domain-finally, which puts them in a category of licensed but filled positions. Let us briefly consider the parameterisation of projection before concluding the discussion.

6.7.3.1 Parameters for projection

Scheer & Szigetvári (2005) have proposed that to capture the weight or lack of a coda in stress languages within Strict CV, the projection of empty nuclei word-finally is

[31] I observe that the pre-accenting suffixes which cause so-called pre-accentuation on a special mora all either have some semantic/syntactic relation with the following VP, or they modify phi-features of the NP. Other pre-accenting suffixes which do not accent a special mora do not seem have a link with the following VP and seem only to form an NP or AdvP. 'Pre-accenting' for the former type of affix seems to be more of a process of leaving the derived final accent in domain [A] to remain. I tentatively claim that the nature of accent assignment here may be related to the syntactic structure of these words, but at this stage this remains an observation. I leave this issue to further research.

[32] I do not have space to consider other pre-accenting morphemes such as /-ku/ 'district' and /-eki/ 'station/ which are pre-accenting, but do not accentuate the immediately preceding special mora, as in /tokjoReki/ giving [tokjooeki] rather than *[tokjooeki]. I propose that this is due to these so-called 'noun-pre-accenting suffix' words being Non-Analytic words or [noun-suffix], with the noun-final 'special mora' having a non-projected V by virtue of being domain-medial. I thank Bjarke Frellesvig for pointing out this issue.

parameterised.[33] In a language such as Latin, the domain-final coda counts for weight, while in Malayalam, codas are not counted for stress formulation. Scheer & Szigetvári claim that this may be simplified in a CV-only framework by parameterising the projection of empty V positions following a C (i.e. the Strict CV definition of a coda). In short, languages may either have a parameter for projection of empty nuclei set to [YES], giving the stress pattern of Latin, or [NO], giving the pattern of Malayalam.

In the spirit of this proposal, I claim that Japanese dialects and possible accent sites are regulated by such parameters. I propose that one parameter regulates the projection of (externally) Licensed and governed filled positions and one regulates the projection of governed empty positions. These two parameters may further be divided into one set regulating domain-medial positions and one set regulation domain-final positions. The settings for Tokyo Japanese would be as shown below.

(72) Projection parameters for Tokyo Japanese

	Domain-Medial	Domain-Final
Independent filled V positions	YES	YES
Lic/Gov filled V positions	NO	YES
Governed empty V positions	NO	(Do not occur)

Independent positions always project in Tokyo Japanese, while licensed and governed filled positions are only projected finally. Governed and empty V positions as in a geminate are never projected. One question is how these parameters may account for further dialect variation, which I now touch upon briefly

6.7.3.2 A possible account for dialect variation

This proposal raises the possibility that in certain dialects, governed/licensed V positions may also behave as a projected V word internally as well. Labrune (2012a) has noted that the Izu dialect of Japanese accents the special moras R, N and J word-internally. The accentuation of special moras is also attested most famously in the word [oŃna] 'woman' in Kansai Japanese, which also accents the half of a diphthong and a long vowel (cf. Haraguchi 1977, 1999). I assume that both medial and final governed or

[33] For further parameterisation of stress systems within Strict CV, see Ulfsbjorninn (2015), though the parameters do not examine projection in relation to licensing structure but rather metrical grid theory. I note that the dialect parameters proposed here were developed independently and in isolation from those presented in Ulfsbjorninn, but the proposals are possibly compatible. I relate projection parameters directly to the licensed or governed status of a position at the CV tier before projection, while Ulfsbjorninn uses other mechanisms such as incorporation.

licensed in this dialect may project and receive accent with the projection parameter turned [ON] in both cases.

(73) Projection parameters for Kansai Japanese

	Domain-Medial	Domain-Final
Independent filled V positions	YES	YES
Lic/Gov filled V positions	YES	YES
Governed empty V positions	NO	(Do not occur)

I touch more upon this issue in the conclusion of this thesis, though further work on dialect variation and involvement of 'special moras' is clearly necessary.

6.8 Conclusion of Chapter 6

Above, I have accounted for accent shift found in words containing diphthongs, long vowels, geminates, and syllabic nasals by claiming that accent shift is a product of licensing structure, not of the syllable.

While Yoshida Y. (1999) has previously shown that the non-projection of a nucleus can account for the behaviour of words containing geminates and nasal-obstruent clusters and nuclear fusion can account for the behaviour of long vowels and diphthongs, I argued that the representations were problematic. I pointed out theoretical issues with nuclear fusion (Yoshida S. 1996), which created branching nuclei accounting for accent shift. I also pointed out issues with the representation of the moraic nasal N presented by Yoshida S. (2003), which could not account for nasalisation and tone spreading facts.

I then turned to a Strict CV (Lowenstamm 1996) representation for Japanese. I have proposed that long vowels and diphthongs are formed of two V positions, with the second V position being licensed or governed. Furthermore, I have proposed that a vowel plus 'moraic' N sequence is universally a long nasal vowel. The representation of geminates remained the same. Accent shift is caused in all cases by non-projection of a governed or licensed V position medially I then considered domain-final V positions in diphthongs, long vowels and syllabic nasals, where I show that final positions must be involved in licensing structure through projection. This projection then accounts for marginal accentuation on the 'special moras' in Tokyo Japanese. I concluded by proposing projection parameters, building on Scheer & Szigetvári (2005), to account for accentuation of special moras in Tokyo and Kansai Japanese.

With regards to the first aim of this chapter, I have further refined the site of accent assignment as the antepenultimate projected nucleus (following Yoshida Y. 1999) but I have also unified unaccentable ‘shift’ sites as those containing an un-projected V position. With regards to the second aim, I have revised the structure of long vowels and diphthongs without reference to nuclear fusion and I have proposed that N is a nasal vowel. I continue these revisions in the following chapter. Finally, I have redefined ‘special moras’ as CV pairs containing a non-projected nucleus, while also dividing the set of special moras into R, N and J, which contain a filled V positions, and Q, which contains an empty V position. I now turn to the fuller facts regarding vowel sequences in Tokyo and Owari Japanese.

Chapter 7: Representing long vowels, diphthongs and hiatus

In this chapter, I consider the Strict CV representation of hiatus sequences, diphthongs and long vowels. Previous accounts of long vowels rely on the mora and the syllable or branching constituents (excepting Labrune 2012a,b), while diphthongs are commonly analysed in terms of sonority based formation rules (cf. Kubozono 2015b). Kubozono proposes that a less sonorous vowel e.g. [a] or [o] can form a diphthong with the following more sonorous vowel [i], though crucially the equally sonorous vowel [u] cannot form a diphthong, such as [au]. A similar issue was faced by the Standard GP account of diphthong formation, discussed in the preceding chapter.

Without referring to moras or sonority, I aim to capture the behaviour and representation of long vowels and diphthongs within Strict CV and Element Theory. I extend the representation of long vowels proposed by Scheer (2004) and propose new conditions on the formation of diphthongs through the relationship between vowels and their elemental representations in Tokyo Japanese. I link my proposal for diphthong formation to coalescence in Owari Japanese.

In 7.1, I first present the facts regarding existing vowels in hiatus for the Owari and Tokyo Standard dialects of Japanese. I also discuss glottal stop insertion and gliding which affects certain vowel sequences. Building upon these facts, I present revised representations of long vowels, vowels in hiatus and diphthongs in the following sections. The Tokyo or Standard dialect is discussed in 7.2. I first examine the revised structure of long vowels, and extend a domain-medial representation of long vowels Scheer (2004) to domain-final long vowels. I then consider the representation of diphthongs in Tokyo Japanese and propose that wherever a diphthong is formed, government contracts between the segments of two V positions. Failure of government between V positions gives rise to hiatus vowel sequences terminating in accentable mid-vowels in both dialects e.g. [sao] 'rod'. In 7.3 I discuss Owari Japanese. The representation of long vowels and hiatus is identical to that of Tokyo, but I propose that coalescence is an effect of government between two V positions. The difference between the dialects is captured through the stability of the governor and governee in Tokyo and the fusion of vocalic expressions in Owari.

7.1 Existing vowel sequences in each dialect

To begin, let us examine the existing vowel sequences in Tokyo Japanese and Owari Japanese. I refer below to Standard Japanese rather than Tokyo Japanese as my data is drawn from normative sources (Iwai & Kitahara 1995, NHK & East Co. 2012), though the accent assignment facts are in agreement with the speech of my informants. The existence of vowel sequences is highly restricted within morphologically simplex domains, while nearly any vowel sequence is attested at the boundary of morphologically complex domains.

I first consider morphologically simplex Yamato or native words, followed by Sino-Japanese words. Both types of words are attested in the materials discussing Standard Japanese as well as Owari Japanese. I discuss loanwords only in Standard Japanese, as the Owari materials and my field notes do not include a sufficient amount of loanwords to include comparison. Mimetic words contain no vowel sequences, and I do not discuss them further.

7.1.1 Standard Simplex Yamato vowel sequences

The table in (1) shows attested vowel sequences in native Yamato words which are morphologically simplex. Cells marked with an asterisk are gaps not attested in mono-morphemic words, while those marked with an <H> are gaps explained by diachronic changes, discussed previously.

(1) Standard vowel sequences found in simplex Yamato words

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/		[kai] 'clam'	**au** **H**	[hae] 'fly'	[ao] 'blue'
/i/	[siawase]^{m} 'happy'		**iu** **H**	[ie] 'house'	[ɕio] 'salt'
/u/	***ua**	[uiro:] 'rice cake'		[ue] 'above'	[uo] 'fish'
/e/	***ea**	**ei** **H**	**eu** **H**		[meoto] 'husband and wife'
/o/	***oa**	[koi] 'carp'	**ou** **H**	[koe] 'voice'	

All of the above attested vowel sequences in morphologically simplex Yamato words are present due to loss of consonants during the Early Middle Japanese period. Cells marked <H> are non-existent due to hiatus resolution processes that took place during the Late Middle Japanese period or Early Modern Japanese period. These changes have been discussed previously in Chapter 2.

Where there are gaps in which V_2 is [a], I presume that sequences *[ua], *[ea] and *[oa], are non-existent in Yamato Japanese words due to the diachronic retention of the glides /j/ or /w/ preceding /a/, with [ia] represented only marginally by the word [ɕiawase] 'happiness'. (This word is optionally realised as [ɕijawase]. I discuss gliding below.) Recall from Chapter 2 that the existing vowel sequences were created through the diachronic elision of consonants found word medially. The loss of consonants includes loss of the palatal glide [j] preceding [e] and loss of the labial glide [w] before {e, o, i}. In synchronic terms, the palatal glide [j] is found only preceding {a, u, o} while [w] is found preceding only [a]. Glides were never lost in these positions, which can account for gaps in the attestation of sequences terminating in [a].

7.1.2 Standard Simplex Sino-Japanese vowel sequences

Within morphologically simplex Sino-Japanese morphemes, the attested set of vowel sequences in modern Japanese is even more restricted than that of Yamato words. Consider the attested sequences below in table (2).

(2) Vowel sequences in Standard simplex Sino-Japanese morpheme

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/		[ai] 'love'	***au** **H**	*	*
/i/	*		***iu** **H**	*	*
/u/	*	[sui] 'water'		*	*
/e/	*	***ei** **H**	***eu** **H**		*
/o/	*	*	***ou** **H**	*	

The only existing sequences found in simplex Sino-Japanese morphemes [ai] and [ui]. These sequences themselves are rare, with only 17 morphemes containing these diphthongs attested in Iwai & Kitahara (1995).[1] These vowel sequences are likely directly imported diphthongs from the original Chinese word into Japanese, such as [ai] 'love' cf. Mandarin and Cantonese [ai] 'love'. The vowel sequences marked <H> have undergone sound change, cf. Chapter 2. However, this does not account for the systematic lack of *[oi] within simplex morphemes. I am aware of no reason for this

[1] These are [ái] 'love', [kái] 'meeting', [gái] 'injury', [sái] 'circumstances', [zái] 'wood', [súi] 'pure', [zúi] 'marrow', [tái] 'body', [dái] 'big', [dai] 'generation', [tsui] 'pair', [hái] 'cup', [hai] 'ashes, lung', [bái~ bai] 'double', [rái] 'lightning' and [rúi] 'base, kind'. Some homophones also exist, e.g. [kái] can mean 'shell', 'meeting' and 'floor'. In addition, many may be bound morphemes e.g. [dai] 'big'. These accent patterns are drawn from Iwai & Kitahara (1995) and confirmed by cross-examination of NHK (2012), with glosses drawn from WWWJDIC (2015).

non-occurrence. I assume that the sequence *[oi] is simply absent in Sino-Japanese loan morphemes and constitutes a lexical gap.

7.1.3 Standard loanwords

Loanwords exhibit few restrictions on vowel sequences though /Vi/ sequences behave as diphthongs in an identical manner to those found in Yamato and Sino-Japanese words. In some speakers, [ei] and [ou] diphthongs are reintroduced but this seems to be variable depending on speaker. My informants exhibit long vowels in orthographic <ei> sequences, as in <meiku> 'makeup' realised as [me:ku].

(3) Vowel sequences in Loanwords (drawn from Iwai & Kitahara 1995)

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/		[raibaru] 'rival'	[anaunsu] 'announce'	[baraeti] 'variety'	[kaosu] 'chaos'
/i/	[iniɕiatɕibu] 'initiative'		[kiui] 'kiwi'	[kariesu] 'caries'	[guradʑiorasu] 'gladiolus'
/u/	[njuansu] 'nuance'	[rekuiemu] 'requiem'		[rikuesuto] 'request'	[uok:a] 'vodka'
/e/	[aidea] 'idea'	[misuteiku] 'mistake'	[zeusu] 'Zeus'		[bideo] 'video'
/o/	[doa] 'door'	[hiroik:u] 'heroic'	[had:ouea] 'hardwear'	[poemu] 'poem'	

No particular phonological processes restrict the vowel sequences permitted in loanwords. With regards to accent, the above /Vi/ sequences have pre-antepenultimate accent on the first portion of the vowel sequence when the second half of the diphthong is in antepenultimate position, e.g. [rekuiemu] 'requiem'. Other sequences exhibit no such regularity and do not restrict the accentability of an antepenultimate vowel in sequence, which I discuss further below. Optional glide insertion also operates in many of the sequences above, discussed in 7.1.7.

7.1.4 Standard morphologically complex vowel sequences

Turning to morphologically complex words, it is clear upon viewing the data that there is no restriction upon the occurrence of vowel sequences at a morpheme boundary, including identical sequences. Consider the tables below in (4) and (5). Morphological boundaries are represented with a full stop.

(4) Vowel sequences in complex Yamato words

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/	[uta.awase] 'poetry contest'	[akita.inu] 'Akita (dog)'	[arabia.uma] 'Arabian horse'	[abura.e] 'oil painting'	[ama.otɕi] 'roof leak'
/i/	[ami.age] 'high laced shoes'	[ajumi.ita] 'foot/scaffold board'	[juki.usagi] 'snow rabbit'	[mi.e] 'pretension'	[hiki.otoɕi] 'debit, withdrawal'
/u/	[haru.are] 'spring storm'	[ɸuru.i] 'old-NP'	[karasu.uri] 'snake gourd'	[juku.e] 'course, direction'	[bu.otoku] 'ugly man'
/e/	[magure.atari] 'lucky shot''	[make.iro] 'signs of defeat'	[jane.ura] 'loft'	[ise.ebi] 'spiny lobster'	[kake.otɕi] 'defeat and flight'
/o/	[kumo.aɕi] 'cloud movements'	[kamo.i] 'lintel'	[ko.uri] 'retail'	[kokoro.e] 'understanding, knowledge'	[sato.oja] 'foster parent'

(5) Vowel sequences in complex Sino-Japanese words[2]

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/	[dʑa.aku] 'wicked'	[ka.i] 'effect'	[ɕa.uN] 'company fortunes'	[sa.etsu] 'examination'	[ka.oku] 'house'
/i/	[ɕi.aN] 'thought'	[tɕi.i] 'social status'	[ki.uN] 'trend'	[ki.e] 'conversion'	[ki.oku] 'memory'
/u/	[ɸu.aN] 'anxiety'	[u.iki] 'rainy area'	[ɸu.uN] 'misfortune'	[ku.eki] 'hard toil'	[hatsu.oN] 'pronunciation'
/e/	*	***ei** **H**	***eu** **H**	*	*
/o/	[so.aku] 'crude'	[nʲo.i] 'one's wishes'	***ou** **H**	[o.etsu] 'weeping'	[dʑo.o:] 'queen'

The lack of restriction seen above is arguably due to the existence of a morpheme boundary, as in [kiuN] 'trend'. Homogenous vowel sequences such as [satooja] 'foster parent' are phonetically identical in some realisations to long vowels found within monomorphemic words, as in Yamato [sato:] 'sugar', though a glottal stop or vowel rearticulation may also be inserted between hetero-morphemic vowels (cf. 7.1.7). Gaps in complex Sino-Japanese words are found where hiatus resolution has levelled the sequences in cells marked <H>. I assume that the gaps for *[e.a], *[e.e], and *[e.o] are accidental in Sino-Japanese words, as I find no clear cases for these sequences at a

[2] Data and morphological divisions are drawn from Iwai & Kitahara (1995) and glosses are drawn from the WWWJDIC (EDRDG, 2015).

morpheme boundary in Iwai & Kitahara (1995).[3] It is clear that gaps attested in complex Sino-Japanese and Yamato words are fewer in number than those in simplex words.

7.1.5 The phonological behaviour of Standard Japanese vowel sequences

When one considers how the vowel sequences behave with regards to accent assignment, one realises that the attested sequences can be sorted into three classes. If one first considers words composed of one morphological domain, vowel sequences where V_2 is [e] or [o] in Standard Japanese have both V_1 and V_2 as a possible accent site. These sequences have been characterised as vowels in hiatus in Ch. 6. When V_2 is the vowel [i], however, V_2 may not receive accent.[4] Within a morpheme, vowel sequences of the shape /Vi/ behave as diphthongs. Recall the pattern of accent shift seen in diphthongs found in non-analytic words in the preceding chapter.[5] Data below in (6) exemplifies Yamato, Sino-Japanese and Loan words where antepenultimate accent may be expected, but pre-antepenultimate evidence is found. Hiatus sequences are shown in (7), where antepenultimate accent is assigned with no 'shift' of accent.[6]

(6) Diphthong sequences with pre-antepenultimate accent (Kubozono 2015b)

a.	[hok:áido:]	'Hokkaido'
b.	[masáizoku]	'Maasai Tribe'
c.	[oɕiróibana]	'Marvel-of-Peru, *Mirabilis jalapa*'
d.	[torusutóiden]	'Biography of Lev Tolstoy'
e.	[ɕinsúiɕiki]	'Ship launching ceremony'
f.	[kaisúijoku]	'Swimming in the sea'
g.	[kotozúieki]	'Bone marrow'

[3] The only candidates are a few compounds such as [kake.ai] 'negotiations', in which the first portion is a Yamato de-verbal noun. Morphemes such as [ke] 'hair', [ge] 'gatha, Buddh.', [e] 'picture' and [ze] 'right' are the only Sino-Japanese simple morphemes terminating in [e] listed in Iwai & Kitahara (1995) and are not attested in compounds in this work.
[4] Unless it is domain-final in an unaccented word. This has been discussed in the previous chapter.
[5] Following Yoshida Y. (1999), I assume that these forms are all Non-Analytic. See Chapter 5 for discussion, but see also McCawley (1968) and Kubozono (2001, 2008, 2015a) for discussion of other analysis of compound noun accent formation.
[6] I modify the transcription and glossing slightly. I do not provide input terms for reasons of space. See Kubozono (2015b).

(7) Hiatus sequences with antepenultimate accent (Kubozono 2015b)

a. [asagaóitɕi] ‘Morning glory market’
b. [saódake] ‘Bamboo pole’
c. [kigaéɕitsu] ‘changing room’
d. [naéuri] ‘seedling peddler’
e. [bideóɕitsu] ‘video room’
f. [bideóken] ‘video coupon’
g. [aroéitɕi] ‘aloe market’
h. [donaúgawa] ‘Donau river

While /Va/ sequences are less common and found largely in loanwords, I note that may form hiatus sequences, such as [mademoázeru] ‘mademoiselle’, where the antepenultimate [a] in hiatus is accentuated rather than expected accent on the pre-antepenult [o] if [oa] were a diphthong. Another example of a /Va/ sequence showing behaviour as hiatus is [iniɕiátɕibu] ‘initiative’. Examples of accent assignment on antepenultimate [a] in the sequence [ua] are not evidenced in Iwai & Kitahara (1995), but gliding may break up this hiatus sequence as in [karuuwa] ‘kahlua’. I discuss gliding shortly. The sequence [au] is not a diphthong candidate based on the existence of accent on [u] in loanwords, noted by Kubozono (2015b), though this sequence is only found in a few loanwords and at morpheme boundaries.

As for words that are morphologically complex, such as verbs and compound nouns discussed above, no systematic gaps are found at a morpheme boundary. As these sequences are ostensibly in separate domains, sequences are freer and may be broken up with a glottal stop or vowel re-articulation. The existence of any diphthongs or long vowels is, I propose, not possible when the relevant vowels straddle a morphological boundary, as in the common example *sato-oja* ‘foster parent’, realised as [satoʔoja], versus *satoo-ja* ‘sugar seller’ or [sato:ja] (cf. McCawley 1968, Labrune 2012a:45 and referemces there in). I capture these facts by examining domain structure. I now turn to the Owari dialect, where vowel sequences terminating in [e] or [o] also behave in a different manner to those terminating in [i]. Here we note that coalescence is active in this dialect, but vowel sequences terminating in [e] or [o] are not affected.

7.1.6 Owari sequences

In the Owari dialect, the profile of attested sequences is similar to that of Tokyo/Standard Japanese. Vowel sequences in which V_2 is either [e] or [o] are acceptable in Owari Japanese as well as in Standard Japanese.[7] /Vi/ sequences are absent, having undergone coalescence. I present Yamato simplex words in (8).

(8) Owari dialect simplex Yamato words

V^1/V^2	/a/	/i/	/u/	/e/	/o/
/a/		**[kæ:] 'clam'**	**H**	[mae] 'in front'	[ao] 'blue'
/i/	[ɕiawase] 'happy'		**H**	[ie] 'house'	[ɕio] 'salt'
/u/	*	**[y:ro] 'rice cake'**		[ue] 'above'	[uo] 'fish'
/e/	*	**H**	[ue] 'above'		*
/o/	*	**[kø:] 'carp'**	**H**	[koe] 'voice'	

We must now consider two facts. First, hiatus sequences of the shapes [Ve] and [Vo] are permitted in Owari Japanese and V_2 may receive accent, as in Standard Japanese. Second, diphthongs in Standard Japanese are realised in Owari as a coalesced long vowel, with the Standard sequence [ai] realised in Owari dialect as the vowel [æ:], Standard [oi] as Owari [ø:] and Standard [ui] as Owari [y:].[8]

As might be expected, the coalesced vowels in Owari exhibit restricted accent assignment possibilities as they surface as long vowels. Accent may not be placed on the second nucleus of a long vowel. One finds accent on the initial nucleus in a word such as *ýyro* 'rice cake' or [ý:ro], but never on the second nucleus, or **yýro*. This is identical to the facts regarding unaccentability in Standard Japanese long vowels.

7.1.7 Glottal stop insertion and gliding in hiatus

Two processes affect vowels in hiatus, but never diphthongs or long vowels in Standard/Tokyo Japanese. The first is glottal stop insertion and the second is gliding. McCawley (1968) has noted that preceding a vowel with no onset, a glottal stop is often

[7] There are a few lexical items in which Owari [æ:] is cognate with Tokyo [ae] is found in Tokyo Japanese, as in Owari [hæ:], Tokyo [hae] 'fly'. These cases are irregular and I propose that they are likely reflexes of intermediate *[hai]. See discussion of reduction in Chapter 3.

[8] Kubozono (2015b) discusses optional coalescence in /Vi/ sequences in Tokyo Japanese, such as [takai] 'tall-NP' being realised as [takee]. Further alternations include [sugoi]~[sugee] 'awesome-NP' and [samui]~[samii] 'cold-NP', discussed in Chapter 3. Exceptions are discussed by Hasegawa (1976), including [koitsu] 'this guy', *[keetsu]. This is at odds with the coalescence process in Owari, which is regular, never optional and is not sociolinguistically marked within the dialect.

realised. Vance (2008:58) provides further acoustic evidence that process is also manifested as vowel re-articulation, citing also Martin (1952:13) & Vance (1987:14-15.)[9] According to McCawley, the process of glottal stop insertion is evidenced word-initially in the simplex words [ʔahiru] 'duck' and [ʔitɕi] 'one' and in the morphologically complex words /oN-iN-roN/ [ʔoNʔiNroN] 'phonology', /su-uri/ [suʔuri] 'vinegar seller' and /wara-u/ [waraʔu] 'laugh-NP' (McCawley 1968), where it is clear that vowels are separated by a morpheme boundary. Importantly, McCawley (1968) observes that a glottal stop *never* breaks up a long vowel or diphthong. McCawley (1968) does not explicitly discuss the case of vowels in hiatus, such as [hae] 'fly', but does note glottal insertion in certain examples. Glottal stop insertion is of course not obligatory and may be absent, cf. Poser (1984). I note that such words in my speakers are realised with vowel re-articulation, as discussed by Vance (2008). More recently, Kawahara (2003) has claimed that an optional process of glide insertion is active in Japanese. The context of gliding is restricted and occurs only where glide-vowel sequences are already permitted in native words, discussed in Chapter 1. I note that this process operates largely in loanwords, due to the introduction of various vowel sequences. The process is exemplified with examples from Kawahara (2003). I modify the dataset by removing proper nouns and adding stratum labels.

(9) Gliding in hiatus sequences (Kawahara 2003:11)

a) /ia/ => [ija]:

dai[j]a 'diamond,'	(loan)
pi[j]ano 'piano,'	(loan)
si[j]awase 'happiness,'	(Yamato)
sai[j]aku 'worst'	(Sino-Japanese)

b) /io/ => [ijo]:

i[j]on 'ion,'	(loan)
oni[j]on 'onion,'	(loan)
rai[j]on 'lion'	(loan)

c) /ea/ => [eja]:

he[j]a 'hair,'	(loan)
pe[j]a 'pair,'	(loan)
e[j]akon 'air conditioner'	(loan)

[9] Vowel re-articulation is illustrated in spectrograms with partial closure of the oral tract visible, rather than complete closure as in a glottal stop.

d) /ua/ => [uwa]:

gu[w]ai 'condition'	(Sino-Japanese)
karuu[w]a 'kahlua,'	(loan)
hu[w]an 'worry'	(Sino-Japanese)

e) /oa/=> [owa]:

do[w]a 'door,'	(loan)
o[w]asisu 'oasis,'	(loan)
ko[w]ara 'koala'	(loan)

Above, gliding occurs where a diphthong cannot be formed and where a glide is permitted to occur before the following vowel, such as [a] or [o].

7.1.8 Towards a Strict CV account of long vowels and vowel interaction

Below, my account of long vowels, diphthongs and hiatus seeks to capture two facts. First, I aim to capture the inability of the second V position within a vowel or diphthong to support an accent while permitting the second V position within hiatus to project and be suitable accent site. Second, I aim to capture the inability of the proposed C position in a diphthong or vowel to be accessed for glottal stop insertion or gliding, while allowing it to remain accessible for vowels in hiatus. I present a proposal for long vowels where V_2 is the target of spreading below the CV tier and licensing above the CV tier. For diphthongs, I propose a new type of governing relation below the skeletal tier which is entirely dependent on the elemental content of the two positions.

7.2 Licensing and government in Tokyo Standard Japanese

I now turn to licensing and government in long vowels, diphthongs and hiatus sequences in Tokyo Standard Japanese. All are composed of two vocalic positions (V) and with an intervening empty consonant (C) position. We must account for non-accentuation of the second half of long vowels and diphthongs using principles already described while crucially not referring to the syllable or mora.

In my proposal, both long vowels and diphthongs are formed of two V positions. I propose that the second position within these representations is licensed in long vowels and governed in diphthongs. Hiatus vowels are treated as two independent V positions. Preceding the discussion, consider the representation of relevant words without government and licensing, shown below.

(10) Preliminary representation of [ko:ri] ‘ice’

C_1 V_1 C_2 V_2 C_3 V_3

k o r i

(11) Preliminary representation of [kaigi] ‘meeting’

C_1 V_1 C_2 V_2 C_3 V_3

k a i g i

(12) Preliminary representation of [kaeru] ‘frog’

C_1 V_1 C_2 V_2 C_3 V_3

k a e r u

Note that the proposed C position within a long vowel and diphthong is inaccessible to the process of glottal stop insertion. McCawley (1968) has noted that preceding a vowel with no onset, a glottal stop is often realised. This is evidenced in the simplex words [ʔahiru] ‘duck’ and [ʔitɕi] ‘one’ and the morphologically complex words /oN-iN-roN/ [ʔoNʔiNroN] ‘phonology’, /su-uri/ [suʔuri] ‘vinegar seller’ and /wara-u/ [waraʔu] ‘laugh-NP’ (McCawley 1968). This can be understood as the insertion of a glottal stop into the empty C position found within the above words. Importantly, McCawley (1968) observes that a glottal stop *never* breaks up a long vowel or diphthong. From the CV point of view, this would mean that the C position is inaccessible, both in a word with a long vowel like [ko:ri] ‘ice’ and in a word with a diphthong, like [kaigi] ‘meeting’. We must account for the inaccessibility of C as well as the lack of accentuation for the second V position in a long vowel and diphthong. I begin the discussion with long vowels below.

7.2.1 Long vowels

I propose a representation for domain-medial long vowels in which melody is attached to two adjacent V positions, while the second V position is externally licensed. A final long vowel is similar in structure, but I propose that the final CV unit is licensed by parameter. Consider the following representations of the words [ko:ri] ‘ice’ in (13) and [sato:] ‘sugar’. The dotted arrow below represents licensing.

Above, V_3 is licensed by the end of the domain and melody is associated to this position.

In support of the proposed parameter, consider the fact that some languages forbid final long vowels, while permitting long vowels domain-medially if licensed by a following filled vowel position. Yoshida S. (1993) claims that Palestinian Arabic, Choctaw, Luganda, Turkish and Yawelmani are languages which lack final long vowels while permitting them domain-medially.[12] In these languages, I claim that a lack of long vowels is evidenced as the parameter for domain-final licensing of an empty V position is [OFF]. The second half of a long vowel cannot be licensed externally as there is no final vowel. Further investigation of this parameter is forthcoming.

7.2.1.3 Accentuation failure revisited

Having considered the revised representation for long vowel, I now revisit the reason for unaccentability of the second V in a domain-medial long vowel. The accentability of the head V_1 position in a long vowel (as in [kó:be] 'Kobe city') is derived from the unlicensed and ungoverned nature of the position, leading this nucleus to project and seek a licensor. It is thus visible on the nuclear projection. The unaccentable nature of the second position, V_2, within a long vowel is due to its licensed nature domain-medially. Recall from the previous chapters that only unlicensed or ungoverned positions project. The V_2 position in [ko:ri] is not 'deficient'. The relation between V_1 and V_2 in [ko:ri] 'ice' is one of melody sharing, not government.

7.2.1.4 Silence of the empty C

Finally, consider the silence of the empty C position found within a long vowel. Recall that a long vowel is immune to glottal stop insertion (McCawley 1968). The empty C position is silenced as it is 'buried' in a similar manner to the V position within a geminate and is found within a spreading domain. Now let us turn to the representation of diphthongs and hiatus.

7.2.2 A Strict CV proposal for hiatus and diphthongs

I propose that hiatus sequences and diphthongs are differentiated by the existence of a governing relation between V positions in diphthongs, and a failure of such a relation to form in hiatus. Government between skeletal points of a branching nucleus or nuclear fusion as tools of Standard GP are not available here, and no

[12] See Kaye (1990a, 1995) for fuller discussion of Yawelmani and Turkish within GP. Yoshida S. (1993) and Kaye (1995) claim that a final long vowel fails to exist as there is no following gov't licensor, but this does not account for languages with final long vowels which also ban non-branching constituents.

systematic proposal for diphthong formation in Strict CV has been proposed in the literature.[13] Szigetvari (2013) briefly proposes that V_2 licenses V_1 in a diphthong, but under my proposed definition of an accentable position in Japanese, this would predict that V_2 is accentable and V_1 is not. I aim to account for the unaccentability of V_2 and the restriction of V_2 to [i] in diphthongs.

I propose a new form of government which is called Intervocalic Government (IVG). This proposal is similar in spirit to Infrasegmental Government (IG) proposed by Scheer (2004), where a governing relation between two segments in C positions silences the empty V position within, forming a TR cluster (i.e. branching onset). IVG forms likewise between two segments associated to V positions. The representation of [kaigi] 'meeting' below is representative of words which contain a diphthong, which only ever contain $|\underline{I}|$ in the right-hand V position. The representation of [kaeru] 'frog' in (18) is representative of hiatus sequences.

(17) Representation of [kaigi] 'meeting'

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & | & & | & | & | \\ \text{k} & \text{a} & & \text{i} & \text{g} & \text{i} \\ & |\underline{A}| & & |\underline{I}| & & \end{array}$$

(18) Representation of [kaeru] 'frog'

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & | & & | & | & | \\ \text{k} & \text{a} & & \text{e} & \text{r} & \text{u} \\ & |\underline{A}| & & |\underline{I}| & & \\ & & & |A| & & \end{array}$$

With no further addition to the representations, each vowel sequence would be expected to behave in an identical manner with regards to accent assignment, glottal stop insertion or gliding. This is not the case. Accounting for the facts through licensing and a spreading relation as with long vowels is not possible here. However, I propose that a governing relation can account for the difference between diphthongs and hiatus sequence, with the contraction of IVG being dependent on the elemental character of the segments.

[13] Caratini (2009) discusses German diphthongs but simply proposes that diphthongs are formed in with a possible spreading relation, with no analysis regarding the status of V_2. See Polgárdi (2015) for an analysis of RP English diphthongs where they are VC sequences.

7.2.2.1 Elemental complexity in diphthongs and hiatus

Let us consider the elemental representations of the relevant sequences. In hiatus sequences, the first vowel is one of the set {a, i, u, o}, while the second vowel is {a, e, u, o}.[14] Represented in elements, there is a rise in elemental complexity in words where the first vowel is {a, i, u} and the second is {o, e}. The right-hand vowel is more complex in these cases. The left-hand vowels are only simplex expressions, composed of the elements |$\underline{A}$|, |$\underline{I}$| and |$\underline{U}$|, while the right-hand vowel [e] is represented as |A$\underline{I}$| and [o] as |A$\underline{U}$|. Examples include [ie] 'house', [ue] 'above' and [amae] 'dependency' or [uo] 'fish', [ɕio] 'salt' and [ao] 'blue'. When the hiatus is [oe] as in [koe] 'voice' or [eo] as in [meoto] 'husband and wife', the vowels are represented as |A$\underline{U}$| and |A$\underline{I}$| with an equal complexity profile. Hiatus is also found where the second member is |A| or |U| and equal or falling complexity profiles may be found, as in [au] in [kaunto] 'count' and [ia] in [piano] 'piano' or [doa] 'door' and [hea] 'hair'.

Diphthongs, on the other hand, always have {a, o, u} in the first V position and [i] in the second position, where [i] never supports accent. The elements found in the first V position of a diphthong are |$\underline{A}$|, |A$\underline{U}$| and |$\underline{U}$| while the second position is always |$\underline{I}$|. In a diphthong, V_1 is more complex than V_2 in the case of [oi], while V_1 is equally complex as V_2 in the case of [ai] and [ui].

7.2.2.2 Government and Complexity

I propose that a diphthong is formed when a governing relation contracts between two segments associated to V positions, which I call Inter-Vocalic Government (IVG). The use of branching constituents has been rejected in the previous chapter. However, the unaccentability of V_2 and the lowering or equal complexity profile in a diphthong is reminiscent of the complexity requirement for governing relations between the skeletal points of branching constituents proposed in SGP. We begin by examining the role of complexity, and I refine the analysis subsequently.

The formation of IVG is firstly dependent upon two conditions. First, there must be no segment separating the two V positions. Second, the first vowel position must be more or as complex as the governee, as per the Complexity Condition. Recall the Complexity Condition (KLV 1990, Harris 1994), reproduced below.

[14] Further sequences may be found in loanwords but may have their hiatus broken by glide insertion, discussed by Kawahara (2003).

(19) **The Complexity Condition** (Harris 1994:170)

> Let α and β be melodic expressions occupying the positions A and B respectively. Then, if A governs B, β is no more complex than α.

This condition also regulates government between consonants Scheer (2004) and Cyran (2010).

I first propose that IVG is complexity-based government between segments from left to right, forming wherever it can apply. A hiatus sequence results from failure of IVG, and two individual V positions are the outcome. This is not too dissimilar to previous proposals for diphthongs within Standard GP, but crucially IVG does not involve branching constituents.

7.2.2.3 Diphthongs

Diphthongs are defined by the inability of the second V position to support accent, and this position only ever contains the front element |I|. The left-hand position may be any one of {a, o, u}, represented as |A|, |AU|, and |U| respectively. Recall the relevant pattern below.[15]

(20) Diphthongs from Kubozono (2015b)

[masáizoku]	'Maasai tribe'	(/másai/+/zóku/)
[oɕiróibana]	'Marvel of Peru (flower)'	(/oɕiroi/+/haná/)
[kaisúijoku]	'Swimming in the sea'	(/kaisui/+/jóku/)

Let us first consider the case of a word containing the diphthong [oi] in [oɕiróibana]'Marvel of Peru (flower)'.

(21) Representation of [oɕiróibana]'Marvel of Peru (flower)'

```
C1  V1  C2  V2  C3  V3  C4  V4  C5  V5  C6  V6
    |   |   |   |   |       |   |   |   |   |
    o   ɕ   i   r   o       i   b   a   n   a
                   |U|  →  |I|
                   |A|
```

Consider V_3 and V_4, which form a diphthong. |AU| or [o] is more complex than the |I| or [i]. The Complexity Condition is easily satisfied, as V_3 is more complex than V_4, and a

[15] The below pattern is also noted by Yoshida Y. (1995, 1999). Following Yoshida Y. (1999), I assume that these and other compounds with antepenultimate and pre-antepenultimate accent are non-analytic words, giving the below words a morphologically simplex structure. Note also that the accent pattern of the right term is not preserved, showing a lack of analytic structure.

governing relation contracts between the two positions. IVG is represented with a solid arrow between segments. V_4 does not project and is not counted in terms of accent assignment, and accent is assigned to the pre-antepenultimate V_3, which in the fuller licensing structure would be the head of the penultimate foot.

Now let us consider words containing the diphthongs [ai] and [ui], such as [masáizoku] 'Masai tribe' and [kaisúijoku] 'swimming in the sea'. The representation for each is shown below.

(22) Representation of [masáizoku] 'Masai tribe'

C_1	V_1	C_2	V_2	$\underline{C}_3$	V_3	C_4	V_4	C_5	V_5
m	a	s	a	→	i	z	o	k	u
			$\lvert \underline{A} \rvert$		$\lvert \underline{I} \rvert$				

(23) Representation of [kaisúijoku] 'Swimming in the sea'

C_1	V_1	$\underline{C}_2$	V_2	C_3	V_3	$\underline{C}_4$	V_4	C_5	V_5	C_6	V_6
k	a	→	i	s	u	→	i	j	o	k	u
	$\lvert \underline{A} \rvert$		$\lvert \underline{I} \rvert$		$\lvert \underline{U} \rvert$		$\lvert \underline{I} \rvert$				

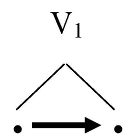
In the diphthongs [ai] and [ui], the Complexity Condition is satisfied, however the complexity between the segments is equal. I claim that a diphthong can form when a V position contains |A| or |U|, and these positions govern a position containing |I|, but the reverse sequences are not possible. Note that the reverse vowel sequence [ia] is largely absent in modern Standard Japanese while, *[iu] has undergone gliding and compensatory lengthening historically e.g. <iu> 'to say' is now [ju:]. These sequences may be found in loanwords as in [raʥiumu] 'radium' or [ɕiata:] 'theatre', but these sequences show no behaviour typical of diphthongs. It is clear that equal complexity does not automatically convert into an IVG relation. [ai] and [ui] are the only diphthongs in modern speech which exhibit equal complexity. Let us consider the role of the elements involved in more detail.

7.2.2.4 |A| as a good governor through structure

A position containing the element |A| adequately governs the element |I|. The special nature of |A| is has been noted in many studies, beginning with Ploch (1995, 1999). |A| is the element *par excellence* for governing relations in many systems, with |A| being required in (underlyingly long) nasal vowels in Québec French (Ploch 1999) and lexical long vowels in Montréal French (Charette, forthcoming) and surface long vowels in Yawelmani (Ploch 1999). Expressions containing |A| are good governors of both |I| and |U| in English diphthongs (Pöchtrager 2015), while |A| is required in the head of diphthongs in German (Ploch 1999:240). |A| is also correlated with the special behaviour of alveolar clusters in English (Harris 1994, Pöchtrager 2006), which may break the otherwise well-respected phonotactics of a language such as English, as in [paint] which has a super-heavy rhyme (cf. Harris 1994, Cyran 2010).

One proposal for the special quality of |A| is that it is in fact composed of structure - Pöchtrager (2006, 2015) proposes that a nucleus containing |A| in fact contains two timing positions, where one controls the other. While I do not follow the full formalism of Pöchtrager's proposal here for reasons of brevity, I represent |A| as two points in a governing relation associated to a V position.

(24) Representation of |A| (modified & simplified)[16]



I assume some form of skeleton to represent the structure, but I do not claim that there is a separate timing skeleton below the CV tier. Here, I show that the points composing |A| are themselves in a governing relation, giving [a].[17] From this point of view, |A| is more complex, having two 'positions', than |I|, which is represented as the single element |I| associated to a V position. From this point of view, the complexity condition is satisfied as |A| is more complex in structure than |I|, which consists solely of an element associated to the V position.

7.2.2.5 |U| as a good governor through inequality of the elements

What is more mysterious is why the sequence |U|-|I| is permitted to form a diphthong, but the sequence |I|-|U| is not. One could first argue that the rarity of /iu/ sequences is solely due to diachronic hiatus resolution, with gliding occurring before

[16] This representation is not true to the principles of the proposed GP 2.0 framework, where relations between skeletal points replace elements. Nevertheless, I propose a simplified structure here for the purposes of exposition.

[17] In the full proposal from Pöchtrager, the points composing |A| are in a control relation and gives [a], whereas a structure lacking control is realised as schwa in a language such as English. The full theory also uses tools such as head-adjunction and provides a reassessment of constituency. A full exploration is well beyond the scope of the current work. See Pöchtrager (2006, 2015), Pöchtrager & Kaye (2013) and Živanovič & Kaye (2010) for more on GP2.0. The crucial point is that there is a relation between the two points for my representation of Japanese |A|, which I use to accounts for failure of IVG shortly.

diphthongisation. Under this view, |I| evacuated its V position to join the preceding C position and form a palatalised glide followed by a vowel during Middle Japanese (cf. Ch. 3 and also Poser 1986), while |U| did not have the same potential as labialised glides were restricted. The [ui] sequences then later formed a diphthong. These arguments say nothing about the reason why [ui] behaves as a diphthong and not [iu]. Diachronic sound change has little to do with explaining synchronic facts. The sequence [iu] *is* in fact acceptable in modern loanwords such as [radʑiumu] ‘radium’ or [ɕimpodʑiumu] ‘symposium’, and [iu] here exhibits no special accentual behaviour.

I propose that a V position dominating |U| has the potential to govern a V position dominating |I|, while the opposite governing relation is not possible, making |U| a better governor than |I|. It should be noted that other languages do display a difference between the abilities afforded to |I| and |U| and expressions which contain them. One example is Turkish, which has unrestricted harmony of |I|, while |U| is restricted in its ability to spread (Charette & Göksel 1994, 1996). Pöchtrager (2015) also notes cases where |I| and |U| are unequal with respect to their distribution in Putonghua (Mandarin Chinese) rimes, English diphthongs and Japanese glide-vowel combinations. While the proposal of element inequality must be studied further, I tentatively put forth the proposal proposal that |U| is a better governor than |I| for Japanese in order to account for the synchronic status of [ui] as a diphthong and [iu] as a vowel sequence. |U| may govern |I| and form a diphthong through IVG, but |I| fails to govern |U| and hiatus is the result.

7.2.2.6 |A| and |U|

In a further note, I point out that |A| cannot govern |U|. I base this on very few loanword examples, with only two clear cases of [au] exhibiting hiatus-like behaviour, namely [donaúgawa] ‘Donau river’ and [rindaújiN] ‘person from Lindau’ (Kubozono 2015b). I claim for the moment that |U| cannot be governed, though this is otherwise expected (c/w English having [ai] and [au] as diphthongs). Other [au] sequences only occur in verbal non-past forms, such as [kanau] ‘come true-NP’. [au] sequences are otherwise absent due to sound change, cf. Ch. 2. For the moment, I simply claim that [au] is not a diphthong in loanwords based on some accent evidence presented from Kubozono (2015b) and I claim that |U| cannot be governed.

7.2.2.7 Hiatus sequences as the result of IVG failure

Now let us consider hiatus sequences. Vowels in hiatus are composed of two V positions, but either position is accentable. Consider the data below exhibiting sample pairs of accented words with hiatus sequences.

(25) Hiatus accent possibilities (sample)

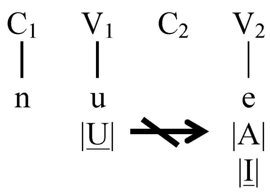
[saó]	'rod'	[áo]	'blue'
[nué]	'chimera'	[júe]	'reason'
[ié]	'home'	[hié]	'chilliness'
[shió]	'salt'	[mío]	'channel, wake'
[osaé]	'weight'	[kamáe]	'structure'

Roughly 55% of simplex Yamato words containing hiatus are unaccented, while the other 45% are accented on either of the two vowels. The theory *must* accommodate the possibility of accent on V_1 and V_2 in hiatus words and must permit projection. In addition, hiatus sequences show no accent shift effects, e.g. [hikaéɕitsu] 'waiting room'.

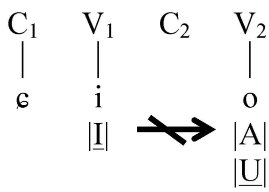
Hiatus sequences can be defined as two independent V positions with no governing relation. IVG in fact *cannot* be enacted and fails, as the potential governor is typically less complex than the governee. Sample representations are shown below in (26a-c), with failure of government represent with a crossed solid line.

(26) Hiatus sequences, as in [nue] 'chimera', [ɕio] 'salt' and [hae] 'fly'.

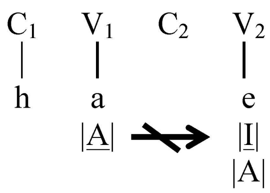
a.



b.



c.



The current definition of IVG cannot account superficially for failure in the sequences with equal complexity terminating in |A| or an expression containing |A|, namely [ia],

[ua], [eo] and [oe], nor those sequences where falling complexity is found superficially in the hiatus sequences [ea] and [oa]. Let us first consider [ia] and [ua].

7.2.2.8 IVG failure through |A| – [ia] and [ua], [oa] & [ea]

Now, let us consider why IVG fails in a word such as [piano] 'piano', allowing the empty C to be vulnerable to gliding, as in [pijano]. In light of the proposal from Pöchtrager (2006, 2015) discussed above, the structure of |A| can understood as a governing domain. I propose that IVG fails to form a diphthong in the sequences [ia] and [ua] as |A| is a governing domain, and this domain cannot be externally governed through IVG as this would violate the Minimality Condition. The relevance of the Minimality Condition (Chomsky 1986) to phonology was proposed by Charette (1989) to account for the observed fact that branching constituents remain resistant to phonological processes. One example of this, relevant for our purposes, is that Korean umlaut affects short vowels, but never long vowels. This is seen in noun and noun+nominative alternations like [pam] 'night' [pæmi] 'night-NOM', but [pa:m] 'chestnut' [pa:mi] 'chestnut-NOM', *[pæ:mi]. Umlaut is analysed by Charette as the spread of |I| under inter-nuclear government from a following nucleus.

Branching nuclei are protected from umlaut by the effects of Minimality. I repeat the portion of the Minimality Condition (Chomsky 1986:42) used by Charette (1986) below.

(27) The Minimality Condition (Narrow interpretation)

In the configuration …α…[γ…δ…β…], α does not govern β if γ is the immediate projection of δ excluding α.

This formulation is extended from syntax and excludes alteration of a branching nucleus or onset, or rather governing domains. It is unnecessary to devote fuller discussion of this condition to the current framework; it must be reformulated as branching constituents are banned in Strict CV, and the government found within and across branching constituents and their skeletal points is entirely absent. I argue that the spirit of this principle, which bans alteration of long vowels and other governing domains, can be reformulated as a ban on the attempted government of existing licensing domains, found in CV long vowels, or governing domains, found in CV as C-to-C domains (Cyran 2010, Szigetvári 2013), IVG (proposed here), and Infrasegmental Government (Scheer 2004). I tentatively present a proposal for Revised CV Minimality below.

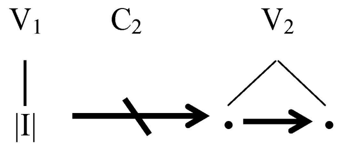
(28) Revised CV Minimality

A segment α in position A cannot govern segment β in Position B if position B or segment β is in a governing or licensing relation.

The above condition would prevent the government of segments in long vowels or geminates or C-to-C or V-to-V (IVG) domains. The governing relation in the |A| structure is part of V position, while IVG applies upon processing of a domain.

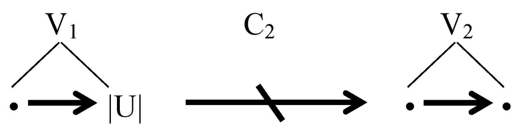
Minimality excludes all government of expressions containing |A|, which I have characterised as a structure where two points are in a governing relation. IVG cannot enact in the sequence [ia] or [ua] as Minimality would be violated.[18]

(29) Failure of |I| governing |A| (modified & simplified)



Let us now extend this line of reasoning to the sequences [ea] and [oa]. Without referring to the revised structure of |A| and Minimality, there is no reason why IVG should fail as the Complexity Condition is satisfied. The complex expression |AU̲| or [o] should be able to govern the simplex expression |A̲|, but fails to do so. A word such as [doa] 'door' exhibits optional gliding as in [dowa], meaning the empty C is not silenced within an IVG governing domain. I claim that the failure of IVG here to is due to Minimality. The structure of [o] within Pöchtrager's (2015) extension of representation of |A| is complex, and it contains |U| in the complement position. I propose that |A| cannot be governed due to Minimality and the existence of government within |A|'s structure.[19]

(30) Failure of |AU| governing |A|



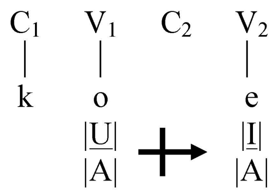
[18] In a language such as RP English, I claim that diphthongs such as [iə] exist as the |A| structure for schwa lacks a governing relation, meaning that Minimality is not violated and IVG may enact.

[19] I again note that though the relation within |A| in Pöchtrager's proposal is not originally proposed as government, the label of the force is not at issue – IVG cannot penetrate the structure of |A| due to the existing relation of the two points within.

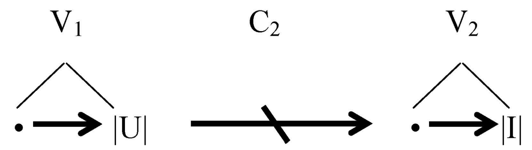
7.2.2.9 IVG failure and Minimality extended – [oe] & [eo]

Now let us consider words with the sequence [oe] as in [koe] 'voice' or [eo] as in [meoto] 'husband & wife'. Accent may be placed on either V, as in the minimal pair [koé] 'manure' and [kóe] 'voice', or as in compound examples like [bideóɕitsu] 'video room'.[20] The vowels are equal in their complexity, but as both positions are accentable, it appears that IVG cannot occur and [oe] must be analysed as a hiatus. We must consider why IVG fails.

(31) Representation of [koe] 'manure'



(32) Failure of |AU| governing |AI|, leading to hiatus in [oe]



Failure of IVG is induced by the existence of the |A| structure and minimality. I claim that the reason for the absence of [oe] and [eo] as diphthongs in Japanese, and other languages, is due to the failure of IVG over any vowel containing Pöchtrager's |A| structure. This failure is captured through Revised Minimality.

7.2.2.10 Extending the proposal and further predictions

This proposal would be easily extended to many other languages and can easily account for a lack of such diphthongs in English and German. Crucially, the valid targets of IVG exclude |A| or [a] in not just Japanese, but also a language such as English or German. These languages exclude any expression containing the element |A| within the second half of diphthongs.

This proposal also predicts that [ei] and [ou] are potential diphthongs for Japanese and other languages. Recall that diachronic *ei* and *ou* sequences are now realised as [o:] and [e:] for many speakers (and indeed those I have surveyed). It is entirely possible that IVG enacted for some speakers and triggered spreading of elements through this relation. Furthermore, there is a lack of [eu] sequences in the

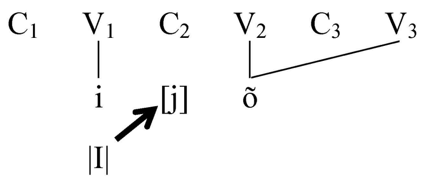
[20] This is the only nominal pair of words exhibiting accent on either vowel. The only other simplex accented words listed in Iwai & Kitahara (1995) are [tatóe] 'even if, ADV' and [oboé] 'memory'.

materials I have examined, so further cross-linguistic investigation on this sequence is necessary. So far, the absence of this sequence can be accounted for by a lack of loanwords with this sequence and the diachronic coalescence of this sequence in Middle Japanese (cf. Ch. 2). For the moment, [eu] is excluded as a diphthong as I have claimed tentatively that |U| cannot be governed, though this is supported by only a small set of data. See Pöchtrager (2015) for an analysis of *[eu] as an ill-formed diphthong in English. Let us now briefly consider the status of the empty C position when IVG fails.

7.2.3 Hiatus and the realisation of the empty C

Recall that gliding or glottal stop insertion/vowel re-articulation is found at morpheme boundaries and between hiatus sequences. Let us first consider gliding, which operates to break hiatus sequences within a domain. Gliding is easily analysed as the spreading of the elements |I| or |U| from a V position into a following empty and ungoverned C position. This is seen in the loanword [ijoN] 'ion' (Kawahara 2003), or more accurately [ijõ:], where the input loanword hiatus undergoes glide insertion. This process only operates where the elements |U| and |I| as glides are phonotactically permitted, i.e. no formation of *[we] is attested by Kawahara (2003).[21] I represent this process below.

(33) Gliding in [ijõ:] 'ion'



Glottal stop 'insertion', or vowel re-articulation, occurs in contexts where gliding is impossible as no element may spread from the left, e.g. [hae] 'fly'. I claim that this is the phonetic interpretation of the empty C position, which is not governed.

Now let us consider empty C positions at morpheme boundaries. Here, glide insertion is blocked according to Kawahara (2003). McCawley (1968) has claimed that glottal stop insertion occurs at morpheme boundaries and separates all vowel sequences, even where diphthong formation is otherwise expected. In terms of compounds, I note that his is found in a complex word such as [kurumaʔído] 'well with a pulley', formed

[21] This process is slightly more complicated and it seems to me, anecdotally, that some speakers may indeed glide in the sequence [ue] as in [ue] 'above' or [uwe]. This requires further systematic investigation on further field trips. In addition, Kawahara (2003) notes that gliding does not seem to affect [iu], [eu] and [eo].

from the morphemes /kuruma/ ‘wheel, car’ and /ído/ ‘well’. This word is formed of two independent analytic morphemes, [kuruma] and [ido] or [[kuruma][ido]]. In the processing of this word, IVG is prevented from applying not by the segmental context, but by the fact that each morpheme is assessed by phonology and alteration to the structure is forbidden through the PSC.

(34) Structure of [kurumaʔido] ‘well with a pulley’

$$\left[\left[\begin{array}{cccccc} C_1 & V_1 & C_2 & V_2 & C_3 & V_3 \\ | & | & | & | & | & | \\ \mathrm{k} & \mathrm{u} & \mathrm{r} & \mathrm{u} & \mathrm{m} & \mathrm{a} \end{array}\right]\left[\begin{array}{cccc} C_4 & V_4 & C_5 & V_5 \\ & | & | & | \\ [\text{ʔ}] & \mathrm{i} & \mathrm{d} & \mathrm{o} \end{array}\right]\right]$$

In the resultant word [kurumaʔído], I claim that the glottal stop (or vowel re-articulation) is the realisation of an empty and available C position. As IVG cannot enact, the empty and ungoverned C position receives an interpretation. Note that gliding cannot occur above; there is no local elemental material to spread into C_4, as *[ji] sequences are banned and [a] does not trigger gliding.[22] With regards to gliding, Kawahara (2003) claims that this process is blocked in compound noun, adjective and verbal formation. This can be seen in the adjectival compound [muɕiʔatsui] ‘muggy’ formed from the constituent terms /muɕi/ ‘humidity’ and /atsui/ ‘hot-NP’, which I analyse as [[muɕi][atsui]. The segmental conditions for gliding are met, but *[muɕijatsui] is not attested. I argue that here too gliding is blocked by domain structure and the PSC – gliding cannot affect the empty C as it has already been interpreted and further alteration is banned in the concatenated domain.

I now turn to the Owari dialect. I propose that government enacts when the conditions outlines above are met, and that a corollary of government in this dialect is the fusion of segmental material. I lay out my proposal in 7.3.

[22] |A| does not trigger gliding as it is structure. In some languages, this element may trigger realisation of a pharyngeal or glottal ‘glide’ and I claim this is gliding of |A| as the C position realisation of the same structure. This is in fact a prediction which follows from Pöchtrager (2006) and his usage of Jensen’s (1994) proposal that the glottal element |ʔ| is structure. The structure for |A| and |ʔ| is identical, and I claim that it’s interpretation depends only on whether the structure is associated to a C or V position. Such an analysis is not tenable for Japanese glottal stops, however, as they occur in empty C positions in contexts where |A| is absent, cf. [ajumiʔita] ‘scaffold board’.

7.3.2 Coalescence of Vi sequences

In contrast to the standard dialect, diphthongs are not permitted in the Owari dialect and any such sequences found in Tokyo Japanese are coalesced in Owari. This is seen in the surface form [atsy:] 'hot-NP' from underlying /atsu-i/, cf. Tokyo [atsui].[24] Coalescence applies in morphologically simplex and complex forms wherever a /Vi/ sequence is found, such as adjectives with the non-past suffix /-i/ and nouns suffixed with the locative particle /-i/. Owari nouns containing a coalesced vowel are exemplified in (37), with Tokyo forms given for comparison. Locative nouns are exemplified in (38) and adjectival forms are shown in (39).

(37) Owari nouns (Field notes)

	Owari	Tokyo forms	Gloss	
a.	[ræ:neN]	[raineN]	'next year'	
b.	[ɕiharæ:]	[ɕiharai]	'payment'	
c.	[æ:mæ:]	[aimai]	'unclear'	
d.	[dæ:koN]	[daikoN]	'daikon'	
e.	[kawæ:so:]	[kawaiso:]	'poor thing'	
f.	[æ:tɕi]	[aitɕi]	'Aichi (Pref.)'	
g.	[æ:biki]	[aibiki]	'affair'	
h.	[hæ:]	[hai]	'ashes'	
i.	[kæ:]	[kai]	'clam'	
j.	[ambæ:]	[ambai]	'seasoning'	
k.	[sæ:ko:]	[saiko:]	'best'	
m.	[ø:]	[oi]	'nephew'	
n.	[kø:]	[koi]	'carp'	
o.	[sy:ka]	[suika]	'watermelon'	(Ebata 2013)
p.	[ky:]	[kui]	'post'	(Ebata 2013)
q.	[ugy:su]	[uguisu]	'mockingbird'	(Ebata 2013)
r.	[y:ro]	[uiro:]	'steamed rice '	(Yamada & Niwa 1989)

(38) Owari locative forms (NINJAL 1976, Terakawa 1985).

	Nominal stem	N+Locative /N-i/	Gloss
a.	[nagoja]	[nagojæ:]	'Nagoya'
b.	[furo]	[furø:]	'bath'
c.	[jakuba]	[jakubæ:]	'town hall'
d.	[zæ:ɕo]	[zæɕø:]	'one's own residence/town'

[24] Exceptions to coalescence are found in nominal compounds, discussed shortly.

(39) Owari adjective forms (Ebata 2013)

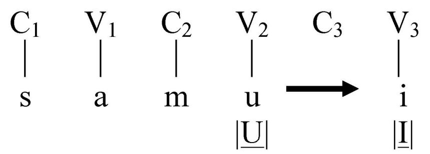
	Non-Past	Transformative	Hypothetical	Gloss
	/Stem-i/	/Stem-naru/	/Stem-kerja/	
a.	[ureɕi:]	[ureɕinaru]	[ureɕikerja]	‘happy’
b.	[takæ:]	[takanaru]	[takakerja]	‘tall’
c.	[nukutø:]	[nukutonaru]	[nukutokerja]	‘warm’
d.	[akary:]	[akarunaru]	[akarukerja]	‘bright’
e.	[atsy:]	[atsunaru]	[atsukerja]	‘hot’
f.	[samy:]	[samunaru]	[samukerja]	‘cold’

I propose that coalescence is an effect of IVG, with government triggering the fusion of elemental material in each V position, for example the adjective stem-final vowel and the element |I| in the non-past suffix. The fused expression is associated to both V positions. Medially, the coalesced vowel patterns with other long vowels with regards to high tone spreading. This is discussed in the following chapter.

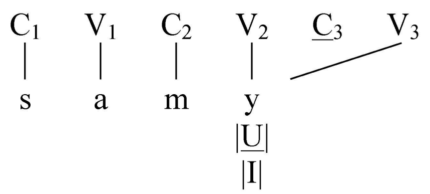
Let us consider coalescence as witnessed in adjectives. A stem is realised in its underlying form when followed by a consonant-initial suffix. The final vowel of /samu-/ ‘cold’ is realised as such when affixed with the hypothetical suffix /-kerja/ ‘if’, as in [samukerja] ‘cold-HYPO’. However, when suffixed with the vocalic non-past suffix /-i/, the stem-final vowel and the suffix coalesce, with the non-past form realised as [samy:] ‘cold-NP’. Consider the underlying and surface representations of the stem and non-past suffix below in (40). IVG is shown with a solid line.

(40) UR of /samu-i/ ‘cold-NP/

a. Underlying form /samu-i/ with IVG



b. Surface form [samy:] ‘cold-NP’



Following the application of IVG, the elements fuse and the product is the front round vowel [y], represented as |IU|. Note that each element preceding coalescence is headed. Following the discussion in Chapter 3, each element is headed in the underlying representation. However, only one element is permitted to be head in a complex expression. Upon combination, one element *must* be demoted to the status of operator. In Chapter 3, I have proposed that in Owari coalescence |$\underline{I}$| is relegated to the status of operator. The resultant expression representing [y] is |I$\underline{U}$|. Such an analysis also accounts for the vowels [ø] and [æ]. The representation of the Tokyo Japanese five-vowel inventory is given in (41). The head of all expressions is underlined and to the right.

(41) Tokyo Japanese vowel system

[i] |$\underline{I}$|				[u] |$\underline{U}$|
	[e] |A$\underline{I}$|		[o] |A$\underline{U}$|	
		[a] |$\underline{A}$|		

Considering the above representations, the combination of |$\underline{I}$| and |$\underline{U}$| yields the expression |I$\underline{U}$|, assuming that |I| is demoted to operator. Now consider the realisation of *o*-final and *a*-final adjectival stems e.g. /nukuto-/ 'warm' and /taka-/ 'tall'. In Owari, their NP forms are [nukutø:] 'warm-NP' and [takæ:] 'tall-NP'. The insertion of |I| as operator into the stem-final vowels [o] |A$\underline{U}$| and [a] |$\underline{A}$| produces the melodic expression |AI$\underline{U}$| for [ø] and |I$\underline{A}$| for [æ] respectively. (Note that I represent |A| as an element and not structure here and below for ease of understanding.) The insertion of |I| as operator also explains why the coalescence of /a/ and /i/ does not produce the vowel [e] or |A$\underline{I}$| or *[take:] 'tall-NP' from /taka-i/ if |$\underline{I}$| were inserted as head. The surface vowel of the Owari system is shown in (42). Underlying and surface representations of the forms for 'cold', 'warm' and 'tall' are shown in (43).

(42) Owari Japanese surface vowel system

[i] |$\underline{I}$|		[y] |I$\underline{U}$|		[u] |$\underline{U}$|
	[e] |A$\underline{I}$|	[ø] |AI$\underline{U}$|	[o] |A$\underline{U}$|	
	[æ] |I$\underline{A}$|	[a] |$\underline{A}$|		

(43) Underlying and Surface forms of NP adjectives

a. Underlying form /samu-i/ ‘cold-NP/

C_1	V_1	C_2	V_2	C_3	V_3
s	a	m	u	→	i
			|U|		|I|

b. Surface form [samy:] ‘cold-NP’

C_1	V_1	C_2	V_2	C_3	V_3
s	a	m	y		
			|U|		
			|I|		

c. Underlying form /nukuto-i/ ‘warm-NP’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
n	u	k	u	t	o	→	i
					|U|		|I|
					|A|		

d. Surface form [nukutø:] ‘warm-NP’

C_1	V_1	C_2	V_2	C_3	V_3	C_4	V_4
n	u	k	u	t	o		
					|U|		
					|A|		
					|I|		

e. Underlying form /taka-i/ ‘tall-NP’

C_1	V_1	C_2	V_2	C_3	V_3
t	a	k	a	→	i
			|A|		|I|

f. Surface form [takæ:] ‘tall-NP’

C_1	V_1	C_2	V_2	C_3	V_3
t	a	k	æ		
			|A|		
			|I|		

In all of the forms above, the NP suffix |I| in the ultimate V position fuses with the preceding vowel as an effect of government. The melody is then associated to both the ultimate and penultimate V positions. The resultant domain contains a coalesced, long vowel which now contains |I| as an operator.

As for the realisation of an /i/ final stem, such as /sabuɕi-/ 'happy', the resultant form shows no alteration in the NP form. The melody in the ultimate and penultimate V positions is identical, the element |I|. Coalescence thus shows no effect and the resultant form is [sabuɕi:] 'lonely-NP'. I assume for the current moment that government occurs, but the result of coalescence is simply a long |I̲| expression. The representation of [sabuɕii] 'lonely-NP' is shown below.

(44) Surface representation of [sabuɕii] 'lonely-NP'

C_1	V_1	C_2	V_2	C_3	V_3	$\underline{C}_4$	V_4
s	a	b	u	ɕ		i	
						|I̲|	

7.3.3 Accounting for compound exceptions

A few exceptions to coalescence are found in Owari Japanese which all seem to be noun-noun compounds. Recall from the preceding chapters that true compounds are composed of three analytic domains in GP, giving a compound noun the structure [[A][B]] or [[noun][noun]]. Consider the compound 'exceptions' to coalescence below, with constituent morphemes to the right.

(45) Owari compound noun exceptions

a. [koibi]	'little finger'	[ko] 'small'	+ [ibi] 'finger'
b. [nakaibi]	'middle finger'	[naka] 'middle	+ [ibi] 'finger
c. [yosoiki]	'going out'	[yoso] 'outside'	+ [iki] 'go-NOM'
d. [wataire]	'cotton stuffed'	[wata]'cotton'	+ [ire]'stuff-NOM'

Note that these words do not constitute exceptions to coalescence if they are composed of two analytic domains. Consider the representation of the word [koibi] 'little finger' below, which I assume composed of the domains [[ko][ibi]]. The [oi] sequence is found straddling the boundary between the [A] and [B] domains.

(46) Structure of [koibi] ‘little finger’

$$\left[\left[\begin{array}{cc} C_1 & V_1 \\ | & | \\ k & o \end{array}\right]\left[\begin{array}{cccc} C_2 & V_2 & C_3 & V_3 \\ & | & | & | \\ & i & b & i \end{array}\right]\right]$$

Assuming that the exceptional noun-noun compounds are analytic, a lack of coalescence is accounted for by considering the PSC (Kean 1974, Kaye 1992). Under this principle, recall that a governing or licensing relation created in the processing of domain [A] or [B] cannot be undone in the processing of domain [AB]. In [[ko][ibi] ‘little finger’, the domains [A] and [B], or [ko] and [ibi], are computed by phonology, and further alteration is banned following concatenation. In the concatenated domain [AB] or [ko_ibi], the PSC prevents IVG from occurring, as this would alter V_2 and it’s ungoverned status and projection derived on the previous computations.[25]

Note that domains are not an obstacle in an adjective such as /taka-i/ ‘tall-NP’, which I presume has the domain shape of [[taka]i] or [[A]B] as in an English past tense verb such as *kicked* or [[kɪk]t]. First, the stem is assessed by phonology in domain [A] or [taka], followed by the computation of domain [AB] or [takai], where the non-past suffix /-i/ is un-assessed by phonology and open to alteration on cycle [AB]. IVG and coalescence thus apply, and the final vowels are fused, giving [takæ:] ‘tall-NP’. Further investigation of Owari nominal compounds and their accent is necessary to confirm analytic status for the above words, though there is little data to build upon in the literature. I leave a deeper investigation of analytic domains in Owari to future research.

7.3.4 Concluding chapter 7

In the preceding sections, I have presented a revised non-branching representation for long vowels and diphthongs. A long vowel domain-medially has its second V position licensed, while the domain-final long vowel is licensed by virtue of being domain-final. I propose then that domain-final long vowels are regulated by parameter.

I claim that a diphthong is formed in Tokyo Japanese through Inter-vocalic government (IVG), and its failure creates a hiatus sequences. A diphthong is redefined

[25] Past tense verbs exhibit coalescence, but these forms are likely non-analytic and lexicalised, e.g. [kæ:ta] ‘write-PAST’ which occurs due to the diachronic elision of stem-final /k/ in the stem /kak-/ ‘write’. I discuss the issue of coalescence in verbs and lexicalisation in Youngberg (2015).

as two segments and their V positions in a governing relation. I connect the failure of IVG crucially to not only complexity, but also the requirement that the governed position does not contain the element |A|, which I claim is a structure containing a governing relation. I connect the impossibility of IVG in this context to the Minimality Condition, first proposed to be relevant for phonology by Charette (1989). I have proposed a revised CV Minimality Condition.

Hiatus is defined in both Tokyo and Owari Japanese as two independent V positions where government has failed, and the empty C otherwise undergoes gliding within a domain if the relevant context is met and glottal stop insertion within and at the edge of a domain. I have defined glottal stop insertion or vowel re-articulation as the phonetic interpretation of the empty C position. This is a parallel to the interpretation of an empty V, which is claimed to be [u] by Yoshida S. (1996, 2003), Yoshida Y. (1999) and Nasukawa (2010). Suspension of gliding and diphthong formation through IVG in complex words was accounted for by considering domain structure, where the PSC blocks alteration of the interpreted empty C position at morpheme edges. The accentual behaviour of the second half of a long vowel or diphthong is accounted for through non-projection of the relevant V position, discussed in the preceding chapter. This has all been done without reference to the syllable or a branching constituent.

I concluded by considering the role of IVG and coalescence in the Owari dialect. I have analysed coalescence in Owari Japanese is an effect of government. IVG occurs in both Standard and Owari Japanese, though the government triggers element fusion in the Owari dialect and not Standard Japanese. Coalescence is *not* an independent phonological process under this view, and the difference between the dialects is in the effect government has upon the segments within the relevant V positions. Suspension of coalescence is analysed as failure of IVG, which I have ascribed to analytic domain structure and the role of the PSC.

Let us turn to the analysis of tone spreading, which supports the preceding proposals and our rejection of the syllable constituent.

Chapter 8: Tone spreading in Tokyo and Owari Japanese

In this chapter, I discuss the process of tone spreading, focusing on Tokyo and Owari dialects. Tone spreading is discussed in the descriptive literature (e.g. Mizutani 1960, Uwano 1977) and in the generative literature (e.g. Haraguchi 1977, Poser 1984, Yoshida Y. 1999). However, the behaviour of heavy syllables (e.g. CVC, CVi, CV:, CVN) as opposed to light syllables (CV) has been discussed only in passing. Furthermore, no analysis thus far accounts for the fact that all 'heavy' syllables do not pattern alike in dialects where pitch spreading is sensitive to the structure of the initial syllable. Heavy syllables containing a long vowel, a diphthong, or a syllabic nasal in these dialects high have tone on the initial mora, while those containing a geminate do not. I propose that the resolution to this division is accounted for through the CV representations I have presented in Chapter 6 and 7.

I first discuss the Tokyo Japanese facts in 8.1 below, presenting two patterns seen briefly in Chapter 1: Tokyo Pattern A, where tone spreading is insensitive to the structure of a word, and Tokyo Pattern B, where tone spreading is encouraged by certain heavy syllables. The Owari dialect process of tone spreading is then discussed in 8.2, with this dialect having a similar pattern to Tokyo Pattern B. I then consider a linear rule account of tone spreading for these dialects from Haraguchi (1977) in 8.3 and I construct a syllable-and-mora account in 8.4. I discuss the problematic facts of each possible analysis. Section 8.5 then shows how CV representations account correctly for Tokyo Pattern A and B spreading, crucially motivating the differentiated structure of the moraic nasal N and geminate Q. I then apply the proposed structures and context for tone spreading to the Owari dialect in 8.6, concluding by showing how the syllable cannot account for these changes.

8.1 Tone spreading in Tokyo and Owari

Tone spreading exists in both Tokyo and Owari Japanese with slightly different characteristics. Yoshida Y. (1999) has proposed that for Standard Japanese, tone spreading occurs regressively from the site of the assigned accent until the initial nucleus, witnessed in the Standard dialect normative speech material (e.g. NHK 1985). This is also the case in Tokyo dialect speech (Uwano 1977), on which the normative Standard is based. Tone spreading finds a different expression in Owari Japanese, where high tone spreading operates only until the pen-initial mora.

Consider the following representative data for nouns and their nominative forms in the Tokyo and Owari dialects, containing only light syllables, drawn from Uwano (1977:284,290). I apply the accent notation from Yoshida Y. (1999).

(1) Tokyo and Owari nominal accent

a) Tokyo nominal forms (Uwano 1977:284)

<u>Citation form</u>	<u>Noun-NOM</u>	Gloss
$\overset{*}{\overline{\text{ka}}}\ \text{bu to}$	$\overset{*}{\overline{\text{ka}}}\ \text{bu to ga}$	‘helmet’
$\text{ko}\ \overset{*}{\overline{\text{ko}}}\ \text{ro}$	$\text{ko}\ \overset{*}{\overline{\text{ko}}}\ \text{ro ga}$	‘heart’
$\text{ka}\ \overline{\text{ga}\ \overset{*}{\text{mi}}}$	$\text{ka}\ \overline{\text{ga}\ \overset{*}{\text{mi}}}\ \text{ga}$	‘mirror’
$\text{sa}\ \overline{\text{ku ra}}$	$\text{sa}\ \overline{\text{ku ra ga}}$	‘cherry tree’

b. Owari forms (Uwano 1977:290)

<u>Citation form</u>	<u>Noun-NOM</u>	<u>Gloss</u>
$\overset{*}{\overline{\text{ka}}}\ \text{bu to}$	$\overset{*}{\overline{\text{ka}}}\ \text{bu to ga}$	‘helmet’
$\text{ko}\ \overset{*}{\overline{\text{ko}}}\ \text{ro}$	$\text{ko}\ \overset{*}{\overline{\text{ko}}}\ \text{ro ga}$	‘heart’
$\text{ka ga}\ \overset{*}{\overline{\text{mi}}}$	$\text{ka ga}\ \overset{*}{\overline{\text{mi}}}\ \text{ga}$	‘mirror’
$\text{sa ku}\ \overline{\text{ra}}$	$\text{sa ku}\ \overline{\text{ra ga}}$	‘cherry tree’

The only difference between Owari and Tokyo Japanese here is the limit of spreading in Owari, which reaches only the pen-initial nucleus. Alternatively, it has been analysed as a delay of pitch rise to the second mora by Uwano (1977).

Let us now consider accent patterns in Tokyo in further detail. Haraguchi (1977) has proposed that spreading in Tokyo comes in two patterns. The more well discussed pattern, which I call Pattern A, is insensitive to syllabic structure. We have already discussed this pattern using the data from Yoshida Y. (1999), where she claims that pitch accent interpretation spreads until the initial nucleus. There is an additional pattern, Pattern B, where the initial nucleus may also be the target of tone spreading under certain conditions.

8.1.1 Tokyo Pattern A

In this dialect, spreading affects all moras except the initial. This spreading pattern can also be found in words with long vowels, diphthongs, syllabic nasal-onset clusters and geminates, as previously noted in Chapter 4 and 5. The Tokyo spreading pattern from Yoshida Y. (1999) is reproduced below in (2) for 'heavy' syllables only. The same pattern is evidenced in normative speech materials such as NHK (1985), though it is also claimed to exist in the speech of some speakers by linguists such as Haraguchi (1977).

(2) Pattern A: Tone spreading until the initial nucleus

[ko $\overline{\text{o ri}}$]	'ice'
[bjo $\overline{\text{o ki}}$]	'illness, sick'
[ka $\overline{\text{i te}}$]	'buyer'
[to $\overline{\text{i ɕi}}$]	'whetstone
[ba $\overline{\text{t ta}}$]	'grasshopper
[ke $\overline{\text{ŋ ka}}$]	'quarrel'

It has already been noted that this data is problematic for a syllable-and-mora analysis. The only point of difference I make is that I claim there is no high pitch on the first portion of a geminate, as such pitch would be phonetically inexpressible. I discuss this point further in the next section.

8.1.2 Tokyo Pattern B: initial syllable weight-sensitive spreading

Haraguchi (1977) discusses an alternative spreading pattern found in Tokyo Japanese which is sensitive to syllable structure, which I call Pattern B.[1] For speakers exhibiting Pattern B, spreading affects the initial mora whenever it is part of a so-called heavy syllable containing a long vowel, diphthong or a syllabic nasal. For the moment, I call this weight-sensitive spreading. Tanaka (2013) calls this process Initial Levelling.

In (3a), I present data exemplifying Tokyo Pattern B with CVN and CV: initial syllables (Haraguchi 1977:33-37). These syllables exhibit high attraction to the initial mora or V position. Following in (3b) is further data from Tanaka (2013) exemplifying tone spreading in CVi, CV: and CVN initial words.[2] In (4), I represent the aforementioned data used by Yoshida Y. (1999), which I re-transcribe with Pattern B for comparison.

[1] According to Haraguchi (1977), this pattern was first noted by Hattori (1954, 1960).
[2] Labrune (2012b:123) claims that Vi sequences undergo initial lowering, as in the word [koikuchi] 'strongly flavoured' which has the tone pattern LHHH, but Tanaka (2013:76) claims that this word exhibits the pattern HHHH as an acceptable variant.

(3) Pattern B spreading in Tokyo Japanese

a. Initial light and heavy syllables from Haraguchi (1977:33-34)[3]

[ko ma gi re]	'(chopped into) small pieces'
[ko na go na]	'crushed to pieces'
[ko o ba N]	'police station'
[ko N da N]	'familiar talk'

b. Words with antepenult accent and initial heavy syllables (Tanaka 2013:75)

[te e ne N pi]	'fuel efficiency'
[sa i ho o so o]	'rebroadcast'
[ha N ba i ki]	'vending machine'
[so o se e ʥi]	'sausage' (Loan)
[da i ha a do]	'Die Hard (film)' (Loan)
[ɕi N de re ra]	'Cinderella'

(4) Unaccented data from Yoshida Y. (1999), retranscribed with pattern B[4]

[sa ku ra]	'cherry tree'
[ko o ri]	'ice'
[bjo o ki]	'illness, sick'
[ka i te]	'buyer'
[to i ɕi]	'whetstone
[ke ŋ ka]	'quarrel'

In the above data, light syllables in the initial position are not affected by tone spreading. Conversely, heavy syllables of the shape CVN, CVJ and CVN in the initial position are affected by high tone spreading. The generalisation that heavy syllables

[3] I retain the transcription method for long vowels, using doubled vowels here, following Haraguchi and Yoshida Y.

[4] These data have been checked with a Tokyo dialect speaker who exhibits Pattern B spreading.

undergo spreading to the initial mora is not true when we examine words with a heavy syllable containing the first portion of a geminate (i.e. CVQ syllables).

(5) Spreading in Geminates (Haraguchi 1977)

Pattern A	Pattern B	Gloss
[ko s se tsu]	[ko s se tsu]	‘broken bone’
[ko p pu]	[ko p pu]	‘cup’

With regards to the spreading commonly claimed to be found on a geminate in Tokyo Pattern A and Pattern B, Haraguchi (1977) claims that geminate consonants do not bear high tone at all, which he says is the more ‘natural’ pattern. When one considers phonetics, it is clear that a geminate cannot bear tone as there is no period of ‘open’ F0 where one would interpret a high tone. To account for the tone claimed to be found on a geminate, Haraguchi proposes that H is in fact not found on a geminate as the mora of a geminate is not a tone bearing unit (TBU), and that any perception of tone on a geminate, such as [kòś:étsú] ‘broken bone’, is an illusion created by the low tone of [ò] and the high tone of [é]. Regardless of how one views tone being expressed on a geminate and the reasons for such perceptions, it is crucial to note that there are no reports of heavy syllables with geminates triggering high tone spreading to the initial mora. This is a fact that has been ignored in all analyses except that of Haraguchi (1977). I show below that the syllable cannot account for this division.[5] Before moving on to a theoretical analysis of the above data, let us consider how tone spreading in Owari compares.

8.2 The Owari Pattern

In the Owari dialect of Japanese, the accent assignment facts are identical to that found in Tokyo: both lexically accented and unaccented words exist, and a geminate, syllabic nasal and second half of a long vowel may not support a lexical accent. Coalescence has removed potential diphthongs from the language and converted them into long vowels, with the exception of certain compounds discussed in the previous

[5] Note that some analyses claim that high tone on the initial mora in the above words is a phonetic (and not phonological) process. These arguments claim that High tone spreading to the initial mora is only phonetic and that all words have an initial Low boundary tone, discussed in Poser (1984) and Pierrehumbert & Beckman (1988). I do not discuss these claims here, but rather I point out that the claims that interpretation of a boundary L tone in heavy syllables is different to that of a light syllable cannot account for the divide in heavy CVJ, CVR and CVN syllables versus CVQ syllables, which is the point I focus on below. This divide is, in my view, a phonological fact which must be accounted for.

chapter. As for tone spreading, the Owari dialect exhibits a similar process to Tokyo Pattern B. The accent pattern for the Owari dialect is exemplified below. Words with three or fewer CV syllables are presented in (6a) and words with more than three CV syllables are presented in (6b), while the spreading patterns for words containing 'heavy syllables' are presented in (6c-f).

(6) Owari forms

a. Words with three nuclei (Uwano 1977)

Citation form	Noun-NOM	Gloss
*	*	
ka bu to	ka bu to ga	'helmet'
*	*	
ko ko ro	ko ko ro ga	'heart'
*	*	
ka ga mi	ka ga mi ga	'mirror'
sa ku ra	sa ku ra ga	'cherry tree'

b. Owari words with more than three nuclei (Ebata 2013)

[u ta ga u]	'doubt-NP'
[o ku ja mi]	'mourning'
*	
[sa ki o to to ɕi]	'three years ago'
[fu ru ɕi ki]	'furoshiki cloth'
[mi ka dzu ki]	'crescent moon'
[mi dzu na bu ri]	'playing in water'

c. Words with initial V: and spreading to the initial nucleus

[to : mo]	'ricefield'
[dæ : do ko]	'kitchen'
[sy : ka]	'watermelon'
[kø : su]	'this person'
*	
[ʥo : da N]	'joke'
*	
[kʲo : ka ɕo]	'textbook'
*	
[o : dæ : ʥi N]	'rich person'

d. Words with pen-initial V: and spreading to the pen-initial nucleus

[o se : bo :]	'end of the year'
[ɕi ø : ga ri]	'shell gathering/clamming'
[e ræ : ga o]	'triumphant look'
[o ɕo : ga t tsa ma]	'the new year'

e. Words with initial or pen-initial heavy syllable containing N

[ni N ni ku]	'garlic'
[re N ko]	'lotus root'
[ba N go ze N]	'dinner'
[wa ɕi N ta :]	'us, 1st plural pronoun'
[bu ra N ko][6]	'swing'
[ta ke N ma]	'stilts, bamboo horse'

f. Owari words with a pen-initial geminate

[ju k ku ri]	'slowly'
[ra k ka se :]	'peanut, ground nut'
[te p po]	'pistol'
[ja k kæ : mo N]	'lazy person'
[bi t ta N ko]	'sopping wet'
[he t tɕi N]	'toilet'

Spreading in the Owari dialect occurs until the pen-initial mora if only light syllables are found in the initial and pen-initial positions, e.g. /sakura/ [sàkùrá] 'cherry tree'. High tone spreads to the initial or pen-initial syllable when there is a long vowel or syllabic nasal present, e.g. /to:mo/ [tó:mó] 'rice field', /ose:bo:/ [òsé:bó:] 'end of the year'. In the data provided in Ebata (2013), I have noted that the same spreading process is never seen when a geminate occurs in the pen-initial position, e.g. [tèp:ó] 'pistol'. Mizutani (1960) first described high tone spreading discussed here as pitch lowering and a delayed rise of pitch. I characterise the process here as the regressive spreading of high

[6] While [buraNko] 'swing' is possibly a Portuguese loanword, it behaves in an identical manner to Yamato and Sino-Japanese words with regards to tone spread.

tone from the site of a lexical accent, in the spirit of Yoshida Y. (1999), though I assume the spreading of an autosegmental H tone.

8.2.1 Capturing the process of tone spreading through rules and the syllable

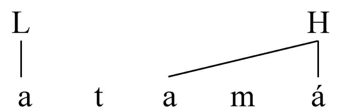
Theories must account for the spreading facts discussed above, not just accent assignment patterns. In the following section, I discuss first the proposal from Haraguchi (1977), who captures tone spread in Tokyo through rules of High Tone Association and Low Tone Insertion. I then discuss a possible treatment using the syllable and the mora. Showing that these analyses are inadequate, I then examine a CV account for tone spreading.

8.3 Tone spreading in an auto-segmental rule-based account

Tone spreading and its limits are captured in the literature typically as a process of High tone association followed by Initial Lowering, following Haraguchi (1977). The process of high tone spreading and low tone insertion is still assumed in contemporary analysis, namely by Labrune (2012a) and Kawahara (2015), so I begin my discussion here.

Haraguchi proposes pitch accent assignment is ordered association of High and Low tones to vowels and the moraic nasal in his early auto-segmental treatment. Considering only Tokyo Japanese, tone association begins first with the assignment of a High (H) tone to the accented vowel in a lexically accented word, marked with a star. If a word is unaccented, the High tone is associated to the final mora in a word.[7] Then, a rule of High Tone association applies, and the H tone spreads from the site of initial association to all moras preceding the site of the accent, which includes both vowels and the moraic nasal N. After the assignment and spread of H, a rule of Initial Lowering applies, where a Low (L) tone is associated to the word-initial vowel. To exemplify, I show his final representation for the finally accented word /atamá/ 'head'.

(7) The surface tone melody of /atamá/ (Haraguchi 1977:16)

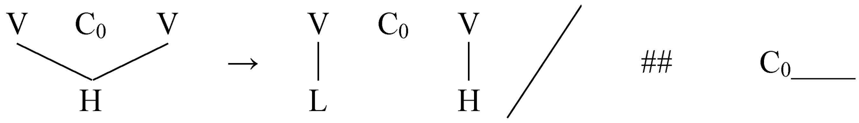


[7] The discussion and representation here is slightly simplified from the source material. Haraguchi (1977) assumes the mora, but uses only the vowel as the site of accent assignment while also using a type of CV notation in his linear rules, though he is not explicit about his representations.

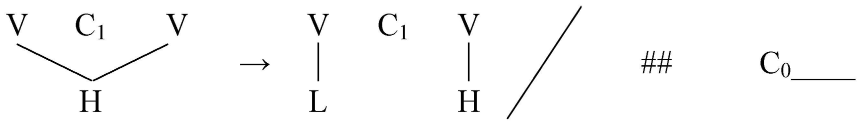
8.3.1 Accounting for the limits of spreading through Initial Lowering

To account for the two Tokyo dialect spreading patterns, Haraguchi proposes two variants of an Initial Lowering rule. In Tokyo Pattern A, the Initial Lowering rule is not sensitive to the structure of the beginning of the word and applies to the first vowel regardless of the following context. In Tokyo Pattern B, the insertion of L into the initial mora applies only when a consonant divides the first two vowels of a word. The two rules for Initial Lowering are provided below in (8) and (9).[8]

(8) Initial Lowering Rule for Pattern A (Haraguchi 1977:33)



(9) Initial Lowering rule for Pattern B (Haraguchi 1977:34)



The rule for Pattern A always applies regardless of a consonant separating the initial and pen-initial moras, giving an initial low in [kòmágíré] 'tiny pieces', [kòóbáŃ] 'police box' and [kòŃdáŃ] 'familiar conversation'.

8.3.2 Pattern B spreading

Let us consider the application now of the Pattern B lowering rule. I provide a representation of [kòmágíré] 'tiny pieces' before and after the rule of Pattern B Initial Lowering in (10), which is identical to the derivation of the same word in Pattern A. In contrast, the words [kóóbáŃ] 'police box' and [kóŃdáŃ] 'familiar conversation' do not meet the context for Pattern B Initial Lowering, shown in (11) and (12). Haraguchi (1977) does not provide a representation for these forms, so I have extrapolated from his discussion for the representations below. Note that he represents a long vowel as [VV] rather than [V:].

[8] C_1 above stands for a single consonant or more, while C_0 means that the rule will apply if there are zero or more consonants in this position. The ## stands for a word boundary though Haraguchi also uses [pause] in some of his rules.

(10) Initial lowering application in [komagire] ‘small pieces’

a. /komagire/ ‘small pieces’ following spread of H tone to all moras

```
      H     H     H     H
      |     |     |     |
   k  o  m  a  g  i  r  e
```

b. [kòmágíré] ‘small pieces’ following Initial Lowering

```
      L     H     H     H
      |     |     |     |
   k  o  m  a  g  i  r  e
```

(11) Representation of Pattern B [koobaN] ‘police box’

```
      H  H     H  H
      |  |     |  |
   k  o  o  b  a  N
```

(12) Representation of Pattern B [koNdaN] ‘familiar conversation’

```
      H  H     H  H
      |  |     |  |
   k  o  N  d  a  N
```

In heavy syllables with a long vowel or syllabic nasal, Haraguchi (1977) proposes that the Initial Lowering rule fails to apply, as these words lack a filled consonant position between the two initial vowels, and the context for the above rule fails to be met. (What is unclear to me is why N is not considered a consonant in the application of the rule, but as Haraguchi presumes that N is a TBU and a geminate is not, I presume that the C in the above rule is defined as a non-TBU.)

Now let us consider the derivation of a word containing a geminate. The relevant data is shown below in (13).

(13) Spreading in geminates (Haraguchi 1977:34)

<u>Pattern A</u>	<u>Pattern B</u>	<u>Gloss</u>
[ko $\overline{\text{s se tsu}}$]	[ko s $\overline{\text{se tsu}}$]	‘broken bone’
[ko $\overline{\text{p pu}}$]	[ko p $\overline{\text{pu}}$]	‘cup’

Haraguchi points out that Initial Lowering applies in both Pattern A and B in words with a geminate, such as [kòs:étsú] ‘broken bone’. The context is met as both singleton and geminate consonants fit the minimum C context in each rule.

8.3.3 Issues with the rule-based analysis

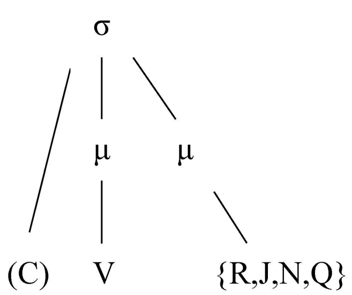
While the proposed rules from Haraguchi (1977) can indeed account for Tokyo Pattern B, these rules crucially depend on rule ordering and language specific rule stipulation. The association, insertion and deletion of tones produce abstract forms which never surface, and there is also the problem of the redundant insertion and deletion of High tones. Most importantly, I note that this analysis assumes the existence of a Low tone. As we have discussed in Chapter 5, Yoshida Y. (1999) claims that L is unnecessary in the analysis of Japanese, as it is not contrastive or active in the system. I have claimed that Tokyo Japanese is best defined as a privative High tone system, as L is not found in head positions or marked on any morphemes. I aim to provide an account for Pattern B without relying on a rule of L insertion.

In addition to these issues, Haraguchi's analysis does not consider the role of structure as a cause for spreading encouragement, but rather a context for L insertion. It would be beneficial to consider how the spreading of H can be delimited by the structure of the syllables involved, rather than proposing various sets of rules. Let us consider how the syllable-and-mora structure fares in accounting for tone spreading.

8.4 The syllable-and-mora approach

I construct a possible syllable-and-mora analysis of tone spreading below. Recall the syllable template presented earlier in Chapter 4, reproduced below. R is shorthand for the second half of a long vowel, J for the [i] within a diphthong, N for the moraic nasal and Q for the first half of a geminate.

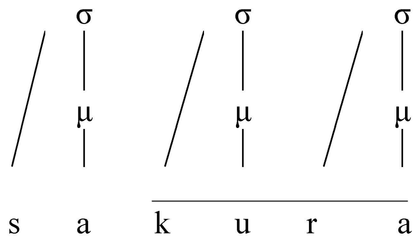
(14) The template for a bimoraic syllable



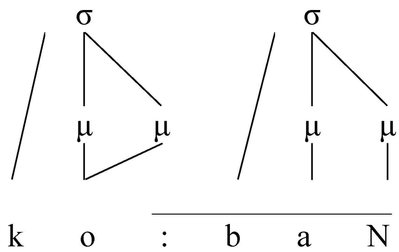
8.4.1 Tokyo Pattern A in a syllable-and-mora based analysis

Regarding the spread of High tone, initial moras are not affected by tone spreading in either the Tokyo A or B when the initial mora is part of a light syllable, as shown below for [sàkúrá] 'cherry tree'. In Pattern A, initial heavy syllables behave in an identical manner, with the initial mora not affected by tone spread. I give the representation and high tone of [kòóbáŃ] ‘police box’ to exemplify Pattern A words beginning in a heavy syllable.

(15) Representation of [sàkúrá] ‘cherry tree’, Pattern A



(16) Representation of [kòóbáŃ] ‘police box’, Pattern A

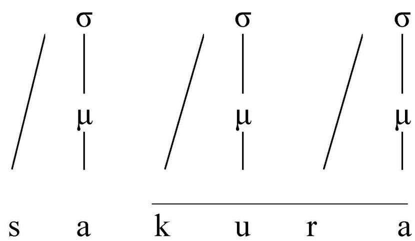


Above, high tone spreads until the initial mora in both word types. However, it is unclear why high tone would not be interpreted on the initial and second mora if a syllable constituent unites them, as discussed earlier. One could claim that this is simply a fact of Tokyo Pattern A and that the moras within a syllable are treated as separate units with regards to spreading, but this is not insightful. The use of this structure becomes problematic further when we consider Tokyo Pattern B.

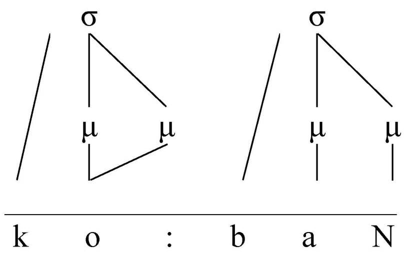
8.4.2 Tokyo Pattern B in a syllable-and-mora based analysis

In the Pattern B dialect, light syllables do not show heavy tone on the initial syllable, as in [sàkúrá] ‘cherry tree’. This is identical to light syllables in Pattern A. A heavy syllable exhibits sharing of accent to the initial mora in a word such as [kó:báŃ] ‘police box’. This is shown below in (17) and (18).

(17) Representation of [sàkúrá] ‘cherry tree’, Pattern B



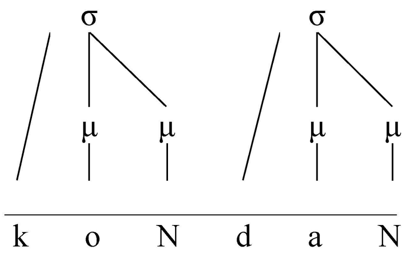
(18) Representation of [kóóbáŃ] 'police box', Pattern B



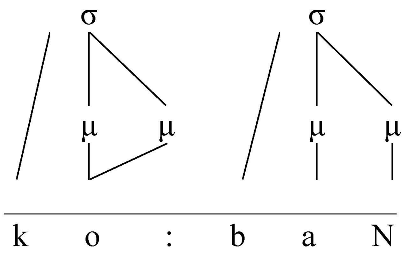
One could argue that the above spreading is analysed as tone sharing to the initial mora. Tone first spreads to the pen-initial mora. The sharing of tone then continues throughout the syllable to the first mora, or the head of the syllable, leading to an initial mora with high tone. One would then have to claim that the difference between Pattern A and Pattern B is that Pattern B shares tone through the syllable. The result of such as process is shown in (19) for heavy syllables with long vowels, diphthongs and vowel-N sequences.

(19) Heavy syllables exhibiting spreading to the initial mora in Pattern B

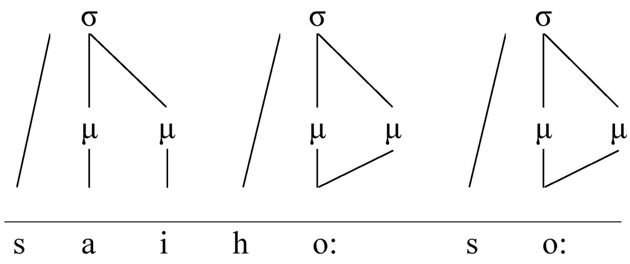
a. Heavy CVN as in [kóŃdáŃ] 'familiar talk'



b. Heavy CV: as in [kóóbáŃ] 'police box'

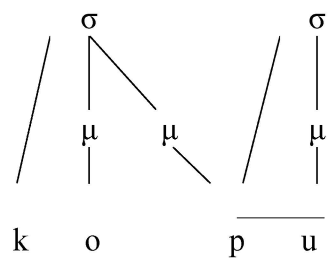


c. Heavy CVi as in [sáíhóósóó] ‘rerun’



Without further elaboration, one would predict that a geminate would also exhibit high tone attraction on the initial mora as structurally this syllable is identical, but this is not the case. Consider the representations in (20).

(20) Heavy syllable with geminate, as in [kòppú] ‘cup’



8.4.3 The problem of the representational unity in heavy syllables

If one argues that Pattern B spreading is sensitive to the structure of a syllable, tone can be analysed as spreading until the initial mora only when a heavy syllable is word initial. However, such an analysis would predict that the first half of a geminate would also receive high tone and share it with the initial mora, giving *[kóssétsú] ‘broken bone’. This is not the case, and the behaviour of geminates is not predicted by the use of the syllable.

To account further for non-sharing of high tone in a syllable containing a geminate, one could stipulate that only the set of moras R, N and J trigger spreading, as proposed by Tanaka (2013). Alternatively, one must stipulate that [-sonorant] segments block tone sharing, as it is not a TBU. Such a statement would need to be further amended to apply only when a consonant is found in the second mora of a syllable. However, it is clear that geminates do not block tone spreading as they do not affect tone spreading when found in other positions. This can be seen in unaccented verbal forms such as [tàtɕíát:éírú] ‘witness, PRES.PROG’, where high tone is realised on all vowels except the initial, and the geminate found in the middle of the verb form is transparent to tone spreading.

8.4.4 To a non-stipulatory account

In order to capture the facts regarding tone spreading, I present an account which differentiates the 'special moras' R, N and J from Q using my proposed structures. No arbitrary differentiation of 'special moras' is necessary. The non-branching and syllable-free representation pursued in the previous chapters can account easily for the facts of both Tokyo Patterns, as well as the Owari Pattern, based on the status of the V position within the first and second CV pairs.

8.5 The role of CV representations and spreading

I propose that tone spreading patterns can be accounted for firstly with one mechanism of high tone spreading. I retain Yoshida Y's proposal that spreading operates regressively from the site of an accent until the initial nucleus. I alter this proposal to reframe spreading within a CV notation, in which spreading occurs until and excluding the initial V position. The difference between dialects is captured through the absolute or variable nature of initial position protection and the limits of spreading in words composed of light syllables.

In Tokyo Pattern A, spreading is insensitive to the status of the initial V position. Yoshida Y. (1999) has argued that the inaccessibility of the initial nucleus to high pitch spreading (or high tone spreading here) is due to initial nucleus protection effects, which also serves as a parsing device. I claim that in Pattern B, initial nucleus protection does not hold and that the status of V_1 suspends syllable protection effects as it is the head of an intervocalic relation and it must spread either melody in long vowels or dispense IVG as in diphthongs. Tone spreading is thus able to access the initial position.

8.5.1 Pattern A revisited

Let us first consider the representation of [sakura] 'cherry tree', shown below.

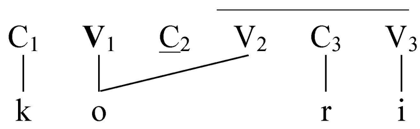
(21) Representation of [sakura] 'cherry tree'

$$\begin{array}{cccccc} C_1 & V_1 & C_2 & \overline{V_2} & \overline{C_3} & \overline{V_3} \\ | & | & | & | & | & | \\ s & a & k & u & r & a \end{array}$$

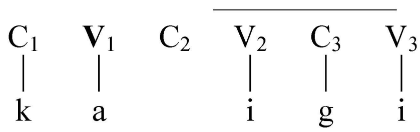
Above, one can see that tone spreads until the initial V position and no further. Yoshida Y. (1999) has already captured Tokyo Pattern A spreading as high tone spreading until the initial nucleus, which I revise slightly to the initial V position. I recall the representative data from chapter 6 below.

(22) Tokyo Pattern A Initial ‘heavy syllables’ in GP,

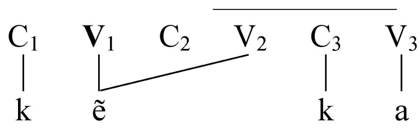
a. CV representation of [koori] ‘ice’



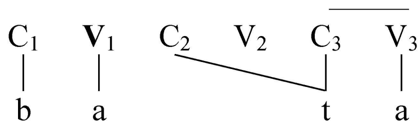
b. CV representation of [kaigi] ‘meeting’



c. CV representation of [kka] ‘quarrel’ (revised)



d. CV representation of [bat:a] ‘locust’ (revised)

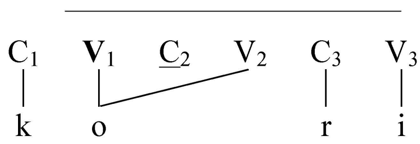


Now let us consider the case of Tokyo Pattern B. Recall that we must divide initial ‘heavy syllables’ in order to account for the tone spreading to the initial position only in words beginning with long vowels, diphthongs and vowel-N sequences.

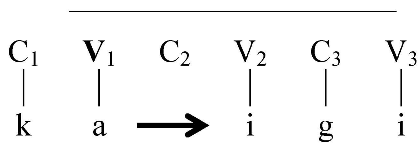
8.5.2 Pattern B: Long vowels and diphthongs

If the V_2 position is the second position within a long vowel or diphthong, tone spreading is encouraged to the initial V_1 position. I propose that tone spreading to V_1 occurs when V_1 is an intervocalic head. Initial protection effects are suspended here as V_1 is not independent. See the representation of an unaccented word with a long vowel or diphthong as in /koori/ ‘ice’ and /kaigi/ ‘meeting’ below, with the head position in bold.

(23) Pattern B representation of [kóórí] ‘ice’



(24) Pattern B representation of [káígí] ‘meeting’



In both of the above words, tone spreading affects the initial V position as it is a head. In /ko:ri/ ‘ice’ shown in (23), V_1 is the melodic head of the long vowel. In /kaigi/ ‘meeting; shown in (24), V_1 is the intervocalic governing head. Tone spreading can be redefined as a process affecting all V positions until the initial V in Tokyo Pattern B, unless a head is found in the initial position, which then suspends V position protection effects.[9] This categorisation will be further supported by the Owari data in section 8.6.

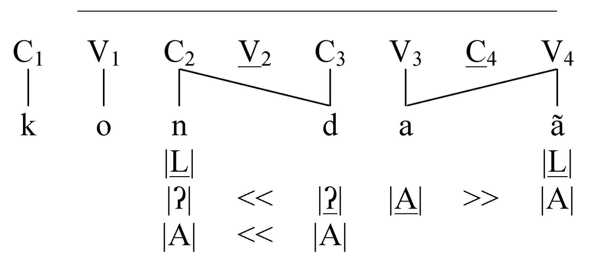
8.5.3 N is not a coda, but a nasal vowel

In Pattern B, I have noted above that heavy syllables containing a moraic nasal, but not a geminate, trigger tone spread to the initial position. Let us revisit our discussion from Chapter 6, where I proposed that Japanese has nasal vowels in all positions and never a nasal coda.

First, consider N as a coda. The realisation of N as a nasal vowel was used by Yoshida S. (2003) in intervocalic and domain-final contexts been used earlier in this thesis for the representation of intervocalic nasals as in [taãi] ‘credit’ and domain-finally as in [hoõ] ‘book’, but he claims that N is a coda consonant which is the target of assimilation in a word such as [hondana] ‘bookcase’. This is also in line with analyses by Itō (1987), Vance (2008), Labrune (2012a) and others. Consider first the ‘coda’ representation of N <koNdaN> ‘familiar talk’. It should not trigger spreading to the initial position.

[9] In this sense, tone attraction would be similar to English stress attraction to a heavy syllable.

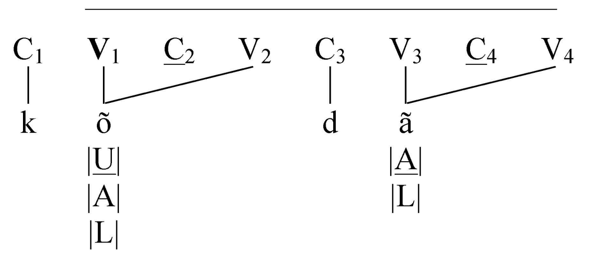
(25) Representation with N as coda for [kondaã] ‘familiar talk’



The previous representation of ‘familiar talk’ shown in (25) cannot account for the tone spreading evidenced in the data for Tokyo Pattern B. The structure of a CVN initial word is different to that of a CV: or CVi initial word and its aberrant behaviour would not be predicted. We could also not explain its lack of unified behaviour with [kos:etsu] ‘broken bone’, which shares a similar structure.

Now consider the representation for the same word with my revised structure of N as a nasal vowel in all contexts. The initial positions contain a long nasal vowel, with V_1 as the melodic head.

(26) Revised representation, assuming [kõ:dã:] ‘familiar talk’



The status of V_1 in all words exhibiting tone attraction to the initial position can now be unified: V_1 is a vocalic head. The above representation crucially contains no nasal consonant and is not predicted to pattern with a word containing a geminate in the initial two CV pairs.

Recall also that I have argued in Chapter 6 that a ‘syllabic nasal’ or ‘moraic nasal’ does not exist as a phonological object. It is likely a theoretical construct influenced by orthographic transcriptions, where nasality is given its independence as <N> or <ん>. It is also possibly impacted by analysis of many other languages where nasal consonants may nasalise a preceding vowel, but behave as consonants, as in English. It is more appropriate to analyse a sequence such as <aN> or <あん> as the nasal vowel /ã:/ not only intervocalically and finally, but also preceding consonants based on the tone spreading evidence.

8.5.4 Geminates do not trigger spreading

Finally, geminates and their structure do not trigger tone spreading as V_1 is not a head. The lack of a head in V_1 allows for initial position protection. This explains why /sakura/ ‘cherry tree’ and /kos:etsu/ ‘broken bone’ lack a high tone on their initial syllable in Pattern B – while their structure is different, V_1 is not a head and is protected from spread in both cases.

(27) CV representation of [kos:etsu] ‘broken bone’ with proper government

C_1	V_1	C_2	$\underline{V_2}$	C_3	V_3	C_4	V_4
k	o			s	e	ts	u

8.5.5 Concluding in Tokyo Pattern B

If we consider the full picture of Tokyo Pattern B tone spread, we can now classify the targets of tone spreading to the beginning of the word based on the status of the V_1 position. CVN, CVR and CVJ heavy syllables are all CVCV sequences where V_1 is a head, suspending initial protection and allowing high tone to spread further. In words where V_1 is not a head, as in a word such as [sakúrá] ‘cherry tree’ or [kos:etsu] ‘broken bone’, the initial V position is not a vocalic head and is protected (as proposed by Yoshida Y. 1999). The word exhibits tone spread up to the initial V, terminating at V_2. Geminates lack a vocalic head; they do not need to provide any ‘blocking effect’. They simply do not provide the context for further spreading. I now turn to the Owari dialect, where the proposed representations can account for tone spread attraction where the syllable-and-mora approach fails.

8.6 Tone spreading in Owari

Let us once again consider the facts of the Owari dialect. The span of tone spread is further constrained in this dialect, and initial and pen-initial V positions are protected in a word such as [sakurá] ‘cherry tree’, while spread in this word in Tokyo also affects V_2 cf. [sakúrá]. However, in an identical manner to Tokyo Pattern B, a heavy syllable with a long vowel or a nasal vowel with the head in the initial or pen-initial position triggers tone attraction to V_1 or V_2, while a word with a geminate does not. Consider the data recalled in part from earlier. Note that I re-transcribe the 'moraic nasal' as a nasal vowel in line with my proposals.

(28) Words with light syllables only

[mi ka dzu ki]	'crescent moon'
[mi dzu na bu ri]	'playing in water'

(29) Words with initial or pen-initial V:

[to : mo]	'ricefield'
[dæ : do ko]	'kitchen'
[ɕi ø : ga ri]	'shell gathering/clamming'
[e ræ : ga o]	'triumphant look'

(30) Words with initial or pen-initial Ṽ:

[nĩ : ni ku]	'garlic'
[rẽ : ko]	'lotus root'
[wa ɕĩ : ta :]	'us, 1st plural pronoun'
[ta kẽ :ma]	'stilts, bamboo horse'

(31) Owari words with a pen-initial geminate

[ju k ku ri]	'slowly'
[ra k ka se :]	'peanut, ground nut'

Tokyo Pattern B and the Owari pattern are identical with respect to head V positions and the behaviour of tone accent spread: head V positions encourage tone spread through suspension of initial (or here pen-initial) V position protection effects. Geminates and light syllables fail to meet the context for spreading as they lack a V head. Consider the representations of Owari words and their tone patterns below. As with Tokyo Pattern B, the so-called moraic nasal also patterns with long vowels and not geminates in this dialect.

(32) CV representation of Owari [sakura] ‘cherry tree’

C_1	V_1	C_2	V_2	C_3	V_3
s	a	k	u	r	a

(33) CV representation of Owari [to:mo] ‘ricefield’

C_1	$\mathbf{V}_1$	$\underline{C}_2$	V_2	C_3	V_3
t	o			m	o

(34) CV representation of [eræ:gáo] ‘triumphant look’

							*		
C_1	V_1	C_2	$\mathbf{V}_2$	$\underline{C}_3$	V_3	C_4	V_4	C_5	V_5
	e	r	æ			g	a		o

(35) CV representation of [rẽ:ko] ‘lotus root’

C_1	$\mathbf{V}_1$	$\underline{C}_2$	V_2	C_3	V_3
r	ẽ			k	o

(36) CV representation of [takẽ:ma] ‘wooden stilts’

C_1	V_1	C_2	$\mathbf{V}_2$	$\underline{C}_3$	V_3	C_4	V_4
t	a	k	ẽ			m	a

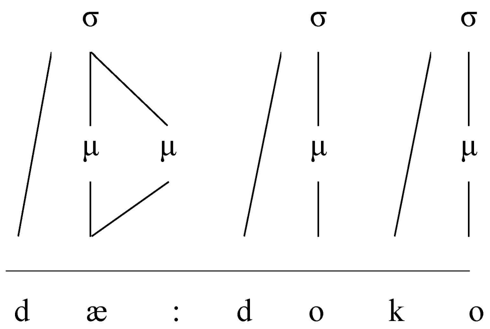
(37) CV representation of [rak:ase:] ‘peanut, ground nut’

C_1	V_1	C_2	$\underline{V}_2$	C_3	V_3	C_4	V_4	C_5	V_5
r	a			k	a	s	e		

8.6.1 Owari and the syllable account

Haraguchi's account relies on serial rules and the disassociation of H followed by L insertion, which I have argued is spurious due to arguments made against the use of the L tone in Chapter 5. In a syllable account, there is no possible method to account for tone spreading to the initial V position except by claiming that a heavy syllable attracts tone. Recall that in an Owari CV word, tone spreads does not affect V_1 or V_2. Let us consider the structure of a lexically unaccented word such as /dæ:doko/ ‘kitchen’ below.

(38) Syllabification with the mora for [dæ:doko] ‘kitchen’



In the above syllabification of the lexically unaccented word /dæ:doko/ ‘kitchen’, note that the initial and pen-initial vowel are found within the first syllable. In Tokyo Japanese, it could be argued that spread to the initial mora is accounted for by spreading accent to the pen-initial mora, which is spread within the syllable to the head initial mora. However in Owari Japanese, neither the initial nor the pen-initial moras are targets of tone spread. The limit of spread is the ante-pen-initial mora. There is no way to account for tone spread without invoking the weight of a syllable. If one claims that a heavy syllable triggers tone attraction, this then wrongly predicts that a word with a heavy syllable with geminates such will trigger tone attraction. This never occurs, as there is no tone attraction to the initial mora in a word such as [rak:ásé:] ‘ground nut’. The syllable and mora account is entirely unable to capture the facts of tone spreading in Owari Japanese.

8.7 Conclusion of Chapter 8

I have shown that tone accent spreading facts in Tokyo Pattern, A Tokyo Pattern B, and Owari Japanese are best accounted for within a CV framework. I have first presented the facts, followed by an analysis of ‘heavy’ syllables within a linear rule based framework proposed by Haraguchi (1977) and a syllable-and-mora framework. The former was shown to posit disparate processes of tone association that did not connect directly to syllabic structure while relying on rules of L insertion. The latter predicted the unified behaviour of heavy syllables with regards to tone spread, or required further stipulations to divide heavy syllables with geminates from other heavy syllables.

In a CV account, I retained the spirit of Yoshida Y.'s (1999) proposal that pitch (or here tone) spreading is regressive and does not affect the initial nucleus (here V position) in order to capture Tokyo Pattern A. I then proposed that tone spread in both Tokyo Pattern B and Owari Japanese is sensitive to the nature of the initial V positions. Tone spread is engendered by the existence of an intervocalic head V position in a long vowel, diphthong or vowel-nasal sequence, which suspends initial V protection.

Crucially, my earlier proposal that a vowel-N sequence is a long nasal vowel accounts correctly for the unified patterning of long vowels, diphthongs and VN sequences. It also correctly accounts for the disjunctive behaviour of the 'special moras' N and Q as they have entirely different structures. A lack of spreading in a 'heavy syllable' is an effect of the structure of a geminate; it is composed of one segment associated to two C positions with no relation to the preceding V position. A lack of V_1 as a head means that this word should, and does, pattern with words beginning light syllables which also lack V_1 as a head. No reliance on rules and reference to special moras is necessary under this view. Dialect differences are captured firstly through the guaranteed or flexible status of initial V protection (Tokyo Pattern A versus Tokyo Pattern B and Owari) and by the typical limits of tone spreading (Initial V in Tokyo A and B, Pen-Initial V in Owari). Let us now turn to the conclusion of the thesis, where I outline further avenues of research.

Chapter 9: Conclusion & further directions

In this thesis, I have presented an analysis of Japanese phonology that does not use the syllable can account for a number of accentual and segmental processes in the Tokyo and Owari dialects. The major outcomes of this investigation are i) a re-definition of the Japanese syllable, with heavy syllables being two CV pairs and degenerate moras as CV pairs with non-projected V positions, ii) new proposals for diphthong formation, long vowel formation and the moraic nasal N as a nasal vowel, iii) the claim that coalescence in the Owari dialect is a side-effect of diphthong formation, iv) a clarification for processes of accent assignment through licensing and v) high pitch spreading as tone spreading delimited by initial nucleus (or V) protection effects expanded from an earlier proposal from Yoshida Y. (1999). The syllable was shown to be unnecessary through alternative formulations of the relevant processes.

9.1 A summary of the major points covered within

Chapter 1 covered foundational information on Japanese phonology. I have also provided a discussion of Owari coalescence, which produces the vowels [y:]. [ø:] and [æ:]. This dialect of Japanese is important as it is a case of rounding coalescence, which is marked (Casali 2011). I extended some evidence of rounding coalescence in other languages, but the descriptions are often poor or little attention is paid to the existence and products of coalescence. I then examined the products of coalescence in Japan, focusing on previous work by Uwano et al (1989) and extended the typology of coalescence by classifying Japanese dialects based on recordings from Kindaichi & Shibata (1966-1972). While Owari coalescence was shown not to be the only dialect with rounding coalescence, it is the only well-document dialect exhibiting rounding coalescence. I chose this dialect as a specimen for examination based on the availability of previous work (Terakawa 1985, Yamada & Niwa 1989, Ebata 2013), with my own field data and observations confirming descriptions in the literature.

Chapter 2 focused on the diachronic developments giving rise to the vowel sequences forming long vowels, diphthongs and hiatus analysed later in the thesis. I first examined Old Japanese coalescence and claimed that this process did not create the vowels in modern dialects. I then examined sound changes which gave rise to vowel sequences, showing that they are the result of both regular and irregular lenition processes, including elision affecting /p/, /w/ and /j/ regularly and elision of /s/, /k/ and /g/ in verbal and adjectival morphology. I also discussed coalescence affecting /Vu/

sequences and /Vi/ sequences. Materials from Rodrigues (1603, 1604) in the LMJ period show evidence of /Vu/ coalescence, with no evidence of /Vi/ coalescence attested. To provide a rough date for the Owari dialect coalescence process affecting /ai/, /oi, and /ui/, I summarised analysis of Edo-period materials from Keshikawa (1971) and Hikosaka (1997), which show that the earliest textual evidence of coalescence is found in texts from the period 1800-1820 C.E. The earliest recordings of speech from the 20th century include speakers born at the end of the 19th century, and these speakers exhibit /Vi/ coalescence. I tentatively concluded that coalescence began somewhere in the period of 1800-1900 C.E., though further research of Edo-period materials for other dialects may shed light on a firmer date for /Vi/ coalescence.

Chapter 3 discussed Element Theory, and I presented a representation of segments and an analysis of coalescence, assimilation and lenition for Japanese vocalic and consonantal expressions. I also captured the vocalic inventories of Tokyo and Owari Japanese through Licensing Constraints. I further proposed that coalescence is captured as a process of vowel fusion. The variable role of the front element |I| in fusion accounts for the different results of coalescence in the Tokyo and Owari dialects. The front element |I| fusing as operator in Owari Japanese gives rise to the fronted vowels [y], [ø] and [æ] from /ui/, /oi/ and /ai/. In Tokyo Japanese, |I| fuses as head and the output expressions for the same vowel sequences are [e:] [e:] and [i:]. I account for the loss of |U| by considering the conflict of headship and the role of Tokyo LCs, where both |I| and |U| must be head. To resolve the conflict of headship, |U| is lost and |I| is the head of the resulting expressions.

Chapter 4 discussed the motivations for the syllable and the mora. I claimed that the syllable is problematic when examining processes such as speech errors, foot formation, pitch accent spreading and word truncation are not sensitive to the syllable. The syllable showed no effect of preservation or unification of segments and I followed Yoshida Y. (1999) and Labrune (2012a,b) in discarding the syllable constituent. I then examined the mora-based proposal from Labrune (2012a,b) who provides an account where accent shift, one of the processes which may motivate the syllable, can be accounted for by involving the deficient structure of ‘special moras’ in an analysis of Japanese accent. While I found value in this proposal, I argued that a hierarchy and constraint setting provide additional machinery which is not necessary and turned to further investigation of representations as a tool to capture the relevant processes.

Chapter 5 began the presentation of a syllable-free analysis from Yoshida Y. (1999), who accounts for Tokyo Japanese accent phenomena within the Government

Phonology framework (Kaye, Lowenstamm & Vergnaud 1990). She argues that only an onset and nucleus pair is needed to account for Japanese accent. I alter the definition of pitch accent and claim that pitch accent in Tokyo and Owari Japanese is the assignment of a High tone, which may spread. Following Yoshida Y. (1999), I reject Low tone for the analysis of Japanese. Accent assignment patterns are accounted for by examining the licensing structure between nuclei, with the relation between two nuclei being roughly equivalent to the metrical foot. All 'feet' are right-headed and composed of two projected nuclei, built from the right edge of a domain. Default antepenultimate accent in words of four or more nuclei is assigned to the head of the penultimate foot. In words of three nuclei or less, the difference between lexically accented and unaccented words was captured by the pre-specification of licensing structure or lack thereof. I also discussed accent assignment morphologically complex forms, following Yoshida Y. in assuming the model of analytic and non-analytic domains (Kaye 1995). I showed that licensing relations between domains can account for accent patterns in suffixed nouns and noun-noun compound. I concluded by proposing an account for accented Yielding and Dominating particles, accounting for their behaviour by claiming that such morphemes are dependent analytic morphemes and independent analytic morphemes respectively.

Chapter 6 focused on the behaviour of long vowels, diphthongs, geminates and nasal-obstruent clusters with regards to accent assignment. In this chapter, I also adopted a CV notation for revised non-branching representations, following Lowenstamm (1996) & Scheer (2004). Accent shift to the pre-antepenultimate nucleus or V position was accounted for by considering the status of the antepenultimate V position, which does not project. As this nucleus cannot project, the pre-antepenultimate nucleus is the head of the penultimate foot and is assigned a pitch accent. I also revised the representation of long vowels and diphthongs. Yoshida Y. depends on nuclear fusion, proposed by Yoshida S. (1996) to account for accent shift. I argued that the creation of surface branching nuclei violates the principles of GP. I therefore proposed that a long vowel or diphthong is composed of two V positions, which I expand upon in Chapter 7. Geminates are constructed from one segment associated to two V positions. I also discussed the moraic nasal N, and I have proposed that all sequences of vowel plus N are in fact long nasal vowels based on their patterning. As a result, the process of nasalisation motivating the syllable is spurious, and the patterning of syllables containing the special mora N with long vowels and diphthongs comes as no surprise. The non-accentuation of the second portion of a diphthong, long vowel and nasal vowel, as well as the empty V within a geminate, is accounted for by extending the hypothesis of non-projection from Yoshida Y. (1999). All domain-medial targets of ‘accent-shift’ were thus unified as un-projected positions. The chapter concluded by examining the status of the ‘special moras’ domain-finally. I proposed that here, the second V position in a long vowel, diphthong or nasal vowel *does* project. The hypothesis of domain-final projection accounts also for the pattern of simplex unaccented words with final special moras and certain ‘pre-accenting’ suffixes. This accounts for marginal accentuation of the ‘special moras’ R, N and J noted by Labrune (2012a).

Chapter 7 focused on a close analysis of vowel sequences and their representation in Tokyo Japanese and Owari Japanese. A long vowel is composed of two V positions with elemental material spreading from V_1 to a licensed V_2. I proposed a new parameter setting for domain-final licensing to account for cross-linguistic variation. A diphthong was characterised as two V positions with independent elemental expressions, and I have proposed that a type of governing relation called Inter-Vocalic Government contracts between them. The role of the elements was shown to be integral to this governing relation, and I have linked the failure of diphthong formation to the structure of low and mid vowels. Integrating a proposal that the element |A| in low and mid vowels is structure from Pöchtrager (2006, 2015), I have claimed that IVG fails as government cannot penetrate an existing governing domain, which follows from the Minimality Condition (Charette 1989). I have presented the Revised CV Minimality Condition, as projections and branching constituents are not found in Strict CV. Hiatus sequences in Japanese form wherever government fails. In Owari Japanese, I argued that government triggers coalescence, with fusion occurring as a result of government. The difference between Tokyo Japanese, which typically lacks coalescence, and Owari Japanese is that government has no fusion effect in Tokyo Japanese. For those speakers of Tokyo Japanes, which do exhibit coalescence as outlined in Chapter 3, it is simple to claim that IVG also causes fusion for these speakers.

Chapter 8 concluded the thesis by examining high tone spreading in Tokyo and Owari Japanese. Tokyo Pattern A exhibits spreading of high pitch up to the initial V or nucleus in all cases, previously discussed by Yoshida Y. (1999). I then analysed an alternative pattern discussed by Haraguchi (1977), which I called Tokyo Pattern B. I showed that this dialect of Japanese exhibits spreading to the up to initial V *unless* the V_1 position is a part of a long vowel, diphthong or a vowel-nasal sequence. An initial heavy syllable containing the first portion of a geminate never triggers accent spreading. I presented arguments against rule and syllable based accounts presented previously. To capture the unified behaviour of long vowels, diphthongs and vowels followed by the 'moraic nasal', I revisited my proposal that a VN sequence is in fact a long nasal vowel, or Ṽ: and I appropriately unified the heavy syllables containing R, N and J as targets of spreading while excluding heavy syllables containing the special mora Q. The classes of words exhibiting spread to the V_1 position are unified as words that have V_1 as an intervocalic head and which have a segment associated also to V_2. I supported my assertions by examining the Owari dialect, where the CV structures proposed accounted for a similar process of pitch spreading. I concluded by showing that the syllable and mora fail to capture the facts of the Owari dialectwithout further stipulations.

9.2 The re-definition of the syllable & the mora

The syllable has been discarded and its effects in accent assignment are now ascribed solely to projection of V positions or lack thereof. Other processes such as nasalisation are spurious under the reanalysis described here. The mora is redefined as a CV unit and language games, metre counting and the like can simply be reframed as referring to V positions rather than the mora. Degenerate, deficient or special moras are those CV pairs containing a non-projected nucleus, due to it being governed or licensed. A long vowel, diphthong and nasal vowel are all in a relation with the preceding V position, while long vowels and nasal vowels are also externally licensed by the following V position. Geminates are unified with these CV pairs in having a governed V position, but there is no relation between this V and the preceding V, thus creating a divide in the category of 'special moras' supported by tone spreading evidence. Reference to light and heavy syllables and weight is unnecessary for Japanese. This has been argued for languages such as Latin by Scheer & Szigetvári (2005), who use projection parameters to regulate the visibility of empty or governed V positions.

9.2.1 Contributions to GP and Strict CV

With respect to the frameworks of GP and its Strict CV developments, I have firstly further developed the analysis of Japanese and eliminated branching representations. I have also further developed the proposals from Yoshida Y. (1999) in order to account for additional accent effects induced by morphology. I develop these ideas further for verbal and adjectival accent in Youngberg (forthcoming). With respect to Strict CV, I have provided a theory of diphthong formation. Though further refinement and cross-linguistic verification is needed, I have provided a first proposal which predicts and restricts the definition of a diphthong in other languages. Lastly, I have proposed a number of parameters regulating projection of domain-medial and domain-final V governed/licensed positions, as well as a parameter regulating the licensing of a final V position by domain, dividing languages which permit final long vowels, like Japanese, from those languages which do not, like Yawelmani and Palestinian Arabic.

9.2.2 Contributions to the study of Japanese dialect phonology

With respect to the study of Japanese, I have provided a formal analysis of coalescence as element fusion under government, contributed a small typology of coalescence, and discussed dialect variation through projection and government. I have also examined the historical roots of vowel coalescence and posited a possible date for Owari coalescence.

9.3 Further avenues of research

9.3.1 Coalescence systems and intergenerational variation

Further investigation is also necessary for coalescence in other dialects such as the Okayama dialect, which has the same coalescence pattern as the Owari dialect. I have also noted in my fieldwork that younger speakers have lost some vowels produced by coalescence, with many speakers producing none of the vowels which Owari is noted for. Younger speakers also lack knowledge of certain morphology, such as Owari dialect honorifics. The intergenerational loss of morphology and phonology of the dialect is a topic worthy of further pursuit. It would be interesting to see how widespread loss of the dialect is, and to see if it occurs in both the Nagoya city centre and smaller towns in the surrounding plain.

9.3.2 The history of coalescence

In Chapter 1 and 2, I provided some discussion of the geographical spread and time depth of coalescence. Further investigation of previous descriptions of dialects and the historical records which note possible dialect variation must be investigated for evidence of coalescence outside of Nagoya. While it is possible that the geographical attestation of Owari-like coalesced vowel systems could represent independent formations of the same vowel system, it is equally possible that coalescence creating an 8 vowel system occurred more widely and was resisted in the regions surrounding the urban centres of Tokyo and Kyoto. Further investigation of early 20th century materials and older works mention dialects will hopefully shed light on whether or not coalescence as found in Owari was once more widespread.

9.3.3 Syllable, syllable-and-mora and mora dialects via projection parameters

With regards to the typological variation between mora, syllable-and-mora and syllable dialects of Japanese, in Chapter 5 I proposed a classification of the Tokyo and Kyoto dialects and their accentable sites based on whether governed positions project or not in domain medial and final positions. Parameters were proposed in the spirit of Scheer & Szigetvári (2005) regulation the projection of governed/licensed V positions. I have briefly mentioned that the 'special moras' in the 'mora' dialect of Kansai Japanese may support an accent, as in [oŃna] 'woman'. I propose that in this dialect, domain-medial governed or licensed V positions which are filled project and form part of the intervocalic licensing structure in a word, not only domain-final positions as in Tokyo. To account for a dialect such as the Kagoshima dialect, which is a 'syllable' dialect, I claim that this dialect **never** projects governed or licensed V positions either domain-medially or domain-finally and only assigns accent to the ultimate or penultimate projected V position. This captures both [hána] 'nose' and [kémui] 'smoky' as being accented on the penultimate projected V position, while the words [haná] 'flower' and [magói] 'black carp' are united as being accented on the ultimate projected V position. Accent on a geminate is never found in Japanese dialects, and I claim that this is because an empty V position can *never* project.

Research into pitch spreading variation is also necessary, to see if the proposal regarding the attracting property of a head is consistent. In addition, I must also consider alternative representations as a means to account for accent facts in each dialect, as perhaps Kansai and Tokyo Japanese differ in their representation of 'special moras'. It is possible that N in Kansai Japanese is in fact a syllabic consonant, with nasality associated to both C and V positions. In addition, tone spreading facts from the Niigata dialect lead me to believe that N is truly a nasal coda in this dialect as it patterns, at least partially, with the special mora Q. I do not discuss this further here, but will revisit it in work to appear.

9.3.4 The moraic nasal

One of the most impactful proposals here is the idea that the moraic nasal N is in fact a nasal vowel, accounting for nasalisation, marginal accentuation and its behaviour in tone spreading. The next area of investigation I plan on undertaking is further study of the 'moraic nasal' N. While I have proposed that N is in fact a nasal vowel in all contexts, further study of the accentual properties of N in other dialects is necessary. In addition, I would like to undertake instrumental phonetic studies to examine the articulation and acoustics of N in speakers of the Owari, Kansai and Tokyo dialects. Further discussion of my proposal and relations to the phonetic literature are found in Youngberg (in press).

9.4 Towards further debate

In light of the current proposals, I look forward to seeing further work on Japanese phonology contributing to the debate between syllable-free and syllabic proposals. I believe my account of Japanese complements the existing literature on syllable-free and non-branching analyses of languages as diverse as Bemba (Kula 2002), Polish (Cyran 2010) and Egyptian Arabic (Fathi 2014), among many others. While Vance (2013), Tanaka (2013) and Kawahara (2016) have criticised Labrune's (2012a) syllable-free proposal for Japanese, and it is hoped that the current proposals have provided a solid response to criticisms of her analysis and resolves doubts for those who would like the syllable to remain in place in analyses of Japanese phonological structure and processes. I also hope that this work proves useful to researchers who are curious as to how a syllable-free representation of a language is implemented. This current work alone surely does not settle the issue of Japanese being syllable-free, and I eagerly await further debate, discussion and evidence on this controversial topic which remains, as of yet, unsettled.

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